### THE OPEN UNIVERSITY OF SRI LANKA

Department of Civil Engineering

Post Graduate Diploma in Technology - Construction Management - Level 7



# CEX7107/CEP2107/CEE7107 - Construction Productivity & Quantitative Techniques

FINAL EXAMINATION - 2006

Time Allowed:	Three	Hours

Date: 2007 - 03 - 19 (Monday)

Time: 0930 - 1230 hrs

Answer Four (04) questions with Two (02) from each section.

## SECTION A - CONSTRUCTION PRODUCTIVITY

Q1.

- Clearly differentiate between Remuneration and Incentives. Discuss, the tinee (05) broad areas i.) of classification of incentives with rationale for application to different groups of employees. (08 marks)
- Discuss the advantages and disadvantages of following three financial incentive schemes when ii.) applied to workers engaged in highway construction work. i.) Piecework schemes ii.) Hours saved schemes Group schemes
- As a Construction Project Engineer attending a project meeting, several important issues should iii.) be clarified in your mind and a few strategic steps have to be planned in advance so as to turn the meeting to your advantage and improve the productivity. Identify and describe these issues and strategic steps.

(09 marks)

(08 marks)

O2.

Describe the basic stages in carrying out a method study and discuss the usage of Multiple i.) Activity Charts in this process.

(08 marks)

Describe the procedure involved in Work Measurement (Time Study) with particular reference ii.) to "rating" as defined in BS 3138. Specifically discuss the factors affecting the rating for typical construction operations.

(08 marks)

Discuss the advantages of Activity Sampling in productivity evaluation of construction work in iii.) the light of convenience, economy, speed and validity of the method.

(09 marks)

Q3.

Productivity of Construction Project Managers is significantly undermined by situations that can i.) be described as 'Time Robbers'. Briefly describe ten (10) of most significant such situations that can arise in the local context.

(08 marks)

Over the duration of a project, the Project Manager has to engage many times in the process of ii.) negotiation. Define the term "negotiation" and explain its importance. Prepare a list of guidelines for the process to be effective.

(08 marks)

- iii.) Describe and discuss the bearing of following factors related to personnel, on construction productivity;
  - a.) Stress

b.) Energy cycle

(09 marks)



SECTION B - QUANTITATIVE TECHNIQUES

- A computer store purchases network cards from one of the two distributors A and B. Amount of defectives in the supply by A is about 2%, while with B it is about 3%. A lot of 1000 network cards consist of about 60% supplied by A. From this lot of 1000 network cards, a batch of 20 network cards is randomly selected for inspection.
  - Compute the probability of finding defective network card. i.)

(05 marks)

Estimate the expected number of defective network cards out of the 20 cards inspected. ii.)

(05 marks)

What is the probability that all 20 network cards inspected are in good condition? iii.)

(05 marks)

What is the probability of finding at least one defective network card from the batch of iv.) 20?.

(05 marks)

Suppose the store can earn a profit of Rs. 150/- from each of the network cards in good v.) condition and the loss from each of the defective network card is Rs. 50/-. Estimate the net profit for the computer store from the lot of 1000 network cards.

(05 marks)

- Q5. The life times of CFL bulbs manufactured by a certain company are normally distributed with an average life of 8000 hours and a standard deviation of 800 hours.
  - What percentage of CFL bulbs could be expected to have a lifetime of more than 9000 i.) hours?

(08 marks)

If a batch of 100 randomly chosen CFL bulbs is inspected, estimate the number of ii.) bulbs that will last more than 8800 hours.

(08 marks)

What life time limits would you expect to contain central 90% of CFL bulbs? iii.)

(09 marks)

A cement manufacturing company claims that the new blended cement they have developed Q6. gives higher compressive strength in concrete as compared to OPC cements available in the market. The 28 day compressive strength (MPa) of 20 concrete cubes made out of the new blended cement according to a given mix proportion are given below, which could be assumed to be normally distributed. From the past experiments, it is known that for the particular mix proportion the 28 day mean compressive strength of cubes with OPC cements is 60 MPa.

57 57 50 59 61 60 64 64 56

Give an estimate for the mean compressive strength with the new cement. i.

(03 marks)

Clearly state the null and the alternative hypotheses you would test to examine the ii. validity of the cement manufacturer's claim, stating whether these-are one sided or two sided hypotheses.

(05 marks)

Suggest a test statistic that can be used to test the validity of the hypothesis stated in part iii.

(05 marks)

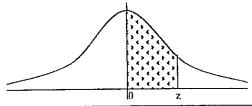
Test the hypothesis stated in part (ii) using a 5% level of significance and clearly state your iv. conclusions.

Will you still use the statistic stated in part (iv), if the population variance of the cube strengths of the new cement is known to be 20 MPa? If not, suggest the changes.

(05 marks)

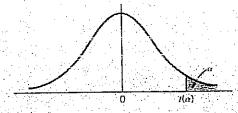


Standard Normal Distribution
Areas under the Standard Normal Curve form 0 to z for various values of z



0.0398 0.0793 0.1179	0.004 0.0438	0.008	0.012	0.04 0.016	0.0199	0.0239	0.0279	0.0319	0250
0.0398 0.0793 0.1179	0.0438				0.01.		,,,,,,	7.0212 [C	0.0359
0.0793 0.1179			0.0517		0.0596	0.0636	0.0675	0.0714	0.0754
0.1179		0.0871				0.1026	0.1064	0.1103 (	).1141
	0.1217				0.1368	0.1406	0.1443	0.148 (	).1517
0.1554					0.1736	0.1772	0.1808	0.1844	0.1879
		<del>                                     </del>		0.2054	0.2088	0.2123	0.2157	0.219 (	).2224
				0.2389	0.2422	0.2454	0.2486	0.2518	).2549
					0.2734	0.2764	0.2794	0.2823	3,2852
					0.3023	0.3051	0.3078	0.3106	0.3133
		<del> </del>			0.3289	0.3315	0.3340	0.3365	0.3389
		ļ l				0.3554	0.3577	0.3599	0.3621
	<del></del>	<del></del>				0.3770	0.3790	0.3810	0.3830
					<del></del> -	0.3962	0.3980	0.3997	0.4015
								0.4162	0.4177
		<del></del>			-		0.4292	0.4306	0.4319
	<del> </del>				<del> </del>		0.4418	0.4429	0.4441
	-				<del> </del>	0.4515	0.4525	0.4535	0.4545
	<del>                                     </del>				<del> </del>	0.4608	0.4616	0.4625	0.4633
<del> </del>	-		<del>}</del> -		<del> </del>	0.4686	0.4693	0.4699	0.4706
	<del>                                     </del>	+	<del></del>	<del> </del>	0.4744	0.475	0.4756	0.4761	0.4767
<del>                                       </del>	<del> </del>	<u> </u>			0.4798	0.4803	0.4808	0.4812	0.4817
	-		<del> </del>	<del>                                      </del>	0.4842	0.4846	0.485	0.4854	0.4857
<del> </del>		<del></del>		<del></del>	0.4878	0.4881	0.4884	0.4887	0.4890
<del></del>			<del> </del>	- <del></del>	0.4906	0.4909	0.4911	0.4913	0.4916
	+	<del></del>	<del> </del>		0.4929	0.4931	0.4932	0.4934	0.4936
<del></del>	<del> </del>		<del> </del>		0.4946	0.4948	0.4949	0.4951	0.4952
					0.496	0.4961	0.4962	0.4963	0.4964
<del> </del>	<del></del>			0.4969	0.497	0.4971	0.4972	0.4973	0.4974
<del> </del>				0.4977	0.4978	0.4979	0.4979	0.498	0.4981
<del> </del>		<del></del>	<del></del>	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
<del>                                     </del>		0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
<del></del>		0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
			0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
	0.4995	0,4995	n 4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
		0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
		0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
		0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
		0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
		<del></del>	0.49996	0.49996	0.49996	0.49996	0.49996	0.49997	0.49997
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 0.49997           0.49997         0.49997           0.49999         0.49999           0.49999         0.49999	0.2881         0.2910         0.2939           0.3159         0.3186         0.3212           0.3413         0.3438         0.3461           0.3643         0.3665         0.3686           0.3849         0.3869         0.3888           0.4032         0.4049         0.4066           0.4192         0.4207         0.4222           0.4332         0.4345         0.4357           0.4452         0.4463         0.4474           0.4554         0.4564         0.4573           0.4641         0.4649         0.4656           0.4772         0.4778         0.4783           0.4821         0.4826         0.483           0.4831         0.4864         0.4868           0.4918         0.4920         0.4922           0.4938         0.4940         0.4941           0.4953         0.4966         0.4967           0.4965         0.4966         0.4967           0.4981         0.4982         0.4982           0.4987         0.4987         0.4987           0.4998         0.4999         0.4999           0.4999         0.4999         0.4999           0.4999 <t< td=""><td>0.2881         0.2910         0.2939         0.2967           0.3159         0.3186         0.3212         0.3238           0.3413         0.3438         0.3461         0.3485           0.3849         0.3869         0.3888         0.3907           0.4032         0.4049         0.4066         0.4082           0.4192         0.4207         0.4222         0.4236           0.4332         0.4345         0.4357         0.437           0.4452         0.4463         0.4474         0.4844           0.4554         0.4564         0.4573         0.4582           0.4641         0.4649         0.4656         0.4664           0.4713         0.4719         0.4726         0.4732           0.4821         0.4826         0.483         0.4834           0.4821         0.4826         0.483         0.4834           0.4831         0.4864         0.4868         0.4871           0.4918         0.4920         0.4922         0.4925           0.4938         0.4940         0.4941         0.4943           0.4953         0.4965         0.4966         0.4976         0.4977           0.4981         0.4982         <td< td=""><td>0.2881         0.2910         0.2939         0.2967         0.2996           0.3159         0.3186         0.3212         0.3238         0.3264           0.3413         0.3438         0.3461         0.3485         0.3508           0.3643         0.3665         0.3686         0.3708         0.3729           0.3849         0.3869         0.3888         0.3907         0.3925           0.4032         0.4049         0.4066         0.4082         0.4099           0.4192         0.4207         0.4222         0.4236         0.4251           0.4332         0.4345         0.4357         0.437         0.4382           0.4452         0.4463         0.4474         0.4484         0.4495           0.4554         0.4564         0.4573         0.4582         0.4591           0.4641         0.4649         0.4656         0.4664         0.4671           0.4713         0.4719         0.4726         0.4732         0.4738           0.4772         0.4778         0.4783         0.4788         0.4793           0.4821         0.4826         0.483         0.4871         0.4875           0.4893         0.4896         0.4898         0.4901&lt;</td><td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289           0.3413         0.3438         0.3461         0.3485         0.3508         0.3749           0.3643         0.3665         0.3686         0.3708         0.3729         0.3749           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265           0.4332         0.4345         0.4357         0.437         0.4382         0.4394           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505           0.4554         0.4564         0.4573         0.4582         0.4591         0.4599           0.4713         0.4719         0.4726         0.4732         0.4738         0.4744           0.4821         0.4826         0.483         0.4834         0.4875         0.4878           0.4833         0.4846         0.4871         &lt;</td><td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315           0.3413         0.3438         0.3461         0.3485         0.3508         0.3531         0.3554           0.3849         0.3869         0.3888         0.3708         0.3729         0.3749         0.3770           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515           0.4554         0.4564         0.4573         0.4582         0.4591         0.4599         0.4608           0.4713         0.4713         0.4713         0.4728         0.4732         0.4738         0.4744</td></td<><td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051         0.3078           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315         0.3340           0.3413         0.3488         0.3461         0.3485         0.3508         0.3531         0.3554         0.3577           0.3643         0.3665         0.3686         0.3708         0.3729         0.3749         0.3770         0.3790           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962         0.3980           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131         0.4147           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279         0.4292           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406         0.4418           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515         0.4526           0.4554         0.4566         0.4664         0.4679         0.4576         0.466</td><td>0.2881         0.2910         0.2939         0.2967        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0.4918         0.4920         0.4922         0.4925           0.4938         0.4940         0.4941         0.4943           0.4953         0.4965         0.4966         0.4976         0.4977           0.4981         0.4982 <td< td=""><td>0.2881         0.2910         0.2939         0.2967         0.2996           0.3159         0.3186         0.3212         0.3238         0.3264           0.3413         0.3438         0.3461         0.3485         0.3508           0.3643         0.3665         0.3686         0.3708         0.3729           0.3849         0.3869         0.3888         0.3907         0.3925           0.4032         0.4049         0.4066         0.4082         0.4099           0.4192         0.4207         0.4222         0.4236         0.4251           0.4332         0.4345         0.4357         0.437         0.4382           0.4452         0.4463         0.4474         0.4484         0.4495           0.4554         0.4564         0.4573         0.4582         0.4591           0.4641         0.4649         0.4656         0.4664         0.4671           0.4713         0.4719         0.4726         0.4732         0.4738           0.4772         0.4778         0.4783         0.4788         0.4793           0.4821         0.4826         0.483         0.4871         0.4875           0.4893         0.4896         0.4898         0.4901&lt;</td><td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289           0.3413         0.3438         0.3461         0.3485         0.3508         0.3749           0.3643         0.3665         0.3686         0.3708         0.3729         0.3749           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265           0.4332         0.4345         0.4357         0.437         0.4382         0.4394           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505           0.4554         0.4564         0.4573         0.4582         0.4591         0.4599           0.4713         0.4719         0.4726         0.4732         0.4738         0.4744           0.4821         0.4826         0.483         0.4834         0.4875         0.4878           0.4833         0.4846         0.4871         &lt;</td><td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315           0.3413         0.3438         0.3461         0.3485         0.3508         0.3531         0.3554           0.3849         0.3869         0.3888         0.3708         0.3729         0.3749         0.3770           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515           0.4554         0.4564         0.4573         0.4582         0.4591         0.4599         0.4608           0.4713         0.4713         0.4713         0.4728         0.4732         0.4738         0.4744</td></td<> <td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051         0.3078           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315         0.3340           0.3413         0.3488         0.3461         0.3485         0.3508         0.3531         0.3554         0.3577           0.3643         0.3665         0.3686         0.3708         0.3729         0.3749         0.3770         0.3790           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962         0.3980           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131         0.4147           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279         0.4292           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406         0.4418           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515         0.4526           0.4554         0.4566         0.4664         0.4679         0.4576         0.466</td> <td>0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051         0.3078         0.3106           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315         0.3340         0.3365           0.3443         0.3465         0.3686         0.3708         0.3729         0.3749         0.3770         0.3790         0.3810           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962         0.3980         0.3997           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131         0.4147         0.4162           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279         0.4292         0.4306           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406         0.4418         0.4429           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515         0.4525         0.4535           0.4713         0.4719         0.4726         0.4732         0.4738         0.4784</td>	0.2881         0.2910         0.2939         0.2967         0.2996           0.3159         0.3186         0.3212         0.3238         0.3264           0.3413         0.3438         0.3461         0.3485         0.3508           0.3643         0.3665         0.3686         0.3708         0.3729           0.3849         0.3869         0.3888         0.3907         0.3925           0.4032         0.4049         0.4066         0.4082         0.4099           0.4192         0.4207         0.4222         0.4236         0.4251           0.4332         0.4345         0.4357         0.437         0.4382           0.4452         0.4463         0.4474         0.4484         0.4495           0.4554         0.4564         0.4573         0.4582         0.4591           0.4641         0.4649         0.4656         0.4664         0.4671           0.4713         0.4719         0.4726         0.4732         0.4738           0.4772         0.4778         0.4783         0.4788         0.4793           0.4821         0.4826         0.483         0.4871         0.4875           0.4893         0.4896         0.4898         0.4901<	0.2881         0.2910         0.2939         0.2967         0.2996         0.3023           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289           0.3413         0.3438         0.3461         0.3485         0.3508         0.3749           0.3643         0.3665         0.3686         0.3708         0.3729         0.3749           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265           0.4332         0.4345         0.4357         0.437         0.4382         0.4394           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505           0.4554         0.4564         0.4573         0.4582         0.4591         0.4599           0.4713         0.4719         0.4726         0.4732         0.4738         0.4744           0.4821         0.4826         0.483         0.4834         0.4875         0.4878           0.4833         0.4846         0.4871         <	0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315           0.3413         0.3438         0.3461         0.3485         0.3508         0.3531         0.3554           0.3849         0.3869         0.3888         0.3708         0.3729         0.3749         0.3770           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515           0.4554         0.4564         0.4573         0.4582         0.4591         0.4599         0.4608           0.4713         0.4713         0.4713         0.4728         0.4732         0.4738         0.4744	0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051         0.3078           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315         0.3340           0.3413         0.3488         0.3461         0.3485         0.3508         0.3531         0.3554         0.3577           0.3643         0.3665         0.3686         0.3708         0.3729         0.3749         0.3770         0.3790           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962         0.3980           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131         0.4147           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279         0.4292           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406         0.4418           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515         0.4526           0.4554         0.4566         0.4664         0.4679         0.4576         0.466	0.2881         0.2910         0.2939         0.2967         0.2996         0.3023         0.3051         0.3078         0.3106           0.3159         0.3186         0.3212         0.3238         0.3264         0.3289         0.3315         0.3340         0.3365           0.3443         0.3465         0.3686         0.3708         0.3729         0.3749         0.3770         0.3790         0.3810           0.3849         0.3869         0.3888         0.3907         0.3925         0.3944         0.3962         0.3980         0.3997           0.4032         0.4049         0.4066         0.4082         0.4099         0.4115         0.4131         0.4147         0.4162           0.4192         0.4207         0.4222         0.4236         0.4251         0.4265         0.4279         0.4292         0.4306           0.4332         0.4345         0.4357         0.437         0.4382         0.4394         0.4406         0.4418         0.4429           0.4452         0.4463         0.4474         0.4484         0.4495         0.4505         0.4515         0.4525         0.4535           0.4713         0.4719         0.4726         0.4732         0.4738         0.4784

#### Student's t Distribution



df         ft.005)         ft.01)         ft.025)         ft.05)         ft.10)         ft.255           1         63.657         31.821         12,706         6.314         3.078         1,000           2         9.925         6.965         4.303         2.920         1.886         0,816           3         5.841         4.541         3.182         2.353         1.638         .765           4         4.604         3.747         2.776         2.132         1.533         .741           5         4.032         3.365         2.571         2.015         1.476         0.727           6         3.707         3.143         2.447         1.943         1.440         .718           7         3.499         2.998         2.365         1.860         1.397         .706           9         3.250         2.821         2.262         1.833         1.937         .706           10         3.169         2.764         2.228         1.812         1.372         0.700           11         3.0012         2.650         2.160         1.771         1.350         697           12         3.055         2.681         2.179						Maria Maria da Arria (1865), es	The Same
2         9,925         6,965         4,303         2,920         1,886         0,816           3         5,841         4,541         3,182         2,353         1,638         .765           4         4,604         3,747         2,776         2,132         1,533         .741           5         4,032         3,365         2,571         2,015         1,476         0,727           6         3,707         3,143         2,447         1,943         1,440         .718           7         3,499         2,598         2,365         1,895         1,415         .711           8         3,355         2,896         2,306         1,860         1,397         .706           9         3,250         2,821         2,262         1,833         1,383         .703           10         3,169         2,764         2,228         1,812         1,372         0,700           11         3,106         2,718         2,201         1,796         1,363         697           12         3,055         2,680         2,179         1,782         1,356         695           13         3,012         2,650         2,160         1,771	df	t(.005)	t(.01)	t(.025)	t(.05)	t(.10)	<i>t</i> (.25)
3         5.841         4.541         3.182         2.353         1.638         .765           4         4.604         3.747         2.776         2.132         1.533         .741           5         4.032         3.365         2.571         2.015         1.476         0.727           6         3.707         3.143         2.447         1.943         1.440         .718           7         3.499         2.598         2.365         1.895         1.415         .711           8         3.355         2.896         2.306         1.860         1.397         .706           9         3.250         2.821         2.262         1.833         1.383         .703           10         3.169         2.764         2.228         1.812         1.372         0.700           11         3.106         2.2718         2.201         1.796         1.363         .697           12         3.055         2.681         2.179         1.782         1.356         .695           13         3.012         2.650         2.160         1.771         1.350         .694           14         2.977         2.642         2.131         1.	1	63.657	31,821	12.706	The second secon		
3         5.841         4.541         3.182         2.353         1.638         .765           4         4.604         5.747         2.776         2.132         1.533         .741           5         4.032         3.365         2.571         2.015         1.476         0.727           6         3.707         3.143         2.447         1.943         1.440         .718           7         3.499         2.598         2.365         1.895         1.415         .711           8         3.355         2.896         2.306         1.860         1.397         .706           9         3.250         2.821         2.262         1.833         1.383         .703           10         3.169         2.764         2.228         1.812         1.372         0.700           11         3.106         2.718         2.201         1.796         1.363         .697           12         3.055         2.681         2.179         1.782         1.356         .695           13         3.012         2.650         2.160         1.771         1.350         .694           14         2.977         2.602         2.131         1.7	2	9.925	6.965	4.303	2.920		
5         4.032         3.365         2.571         2.015         1.476         0.727           6         3.707         3.143         2.447         1.943         1.440         718           7         3.499         2.598         2.365         1.895         1.415         711           8         3.355         2.896         2.306         1.860         1.397         .706           9         3.250         2.821         2.262         1.833         1.383         .703           10         3.169         2.764         2.228         1.812         1.372         0.700           11         3.106         2.718         2.201         1.796         1.363         .697           12         3.055         2.681         2.179         1.782         1.356         .695           13         3.012         2.650         2.160         1.771         1.350         .694           14         2.977         2.624         2.145         1.761         1.345         .692           15         2.947         2.602         2.131         1.753         1.341         0.691           17         2.898         2.567         2.110         1.		5.841	4.541	3.182		the state of the second control of	- 10 ATT ETHI
6       3.707       3.143       2.447       1.943       1.440       .718         7       3.499       2.598       2.365       1.895       1.415       .711         8       3.355       2.896       2.306       1.860       1.397       .706         9       3.250       2.821       2.262       1.833       1.383       .703         10       3.169       2.764       2.228       1.812       1.372       0.700         11       3.106       2.718       2.201       1.796       1.363       .697         12       3.055       2.681       2.179       1.782       1.356       .695         13       3.012       2.650       2.160       1.771       1.350       .694         14       2.977       2.624       2.145       1.761       1.345       .692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101	4	4.604	3.747	2.776	2.132	1.533	.741
6       3.707       3.143       2.447       1.943       1.440       .718         7       3.499       2.598       2.365       1.895       1.415       .711         8       3.355       2.896       2.306       1.860       1.397       .706         9       3.250       2.821       2.262       1.833       1.383       .703         10       3.169       2.764       2.228       1.812       1.372       0.700         11       3.106       2.718       2.201       1.796       1.363       .697         12       3.055       2.681       2.179       1.782       1.356       .695         13       3.012       2.650       2.160       1.771       1.350       .694         14       2.977       2.624       2.145       1.761       1.345       .692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101	5	4.032	3.365	2.571			·
7       3.499       2.598       2.365       1.895       1.415       .711         8       3.355       2.896       2.306       1.860       1.397       .706         9       3.250       2.821       2.262       1.833       1.383       .703         10       3.169       2.764       2.228       1.812       1.372       0.700         11       3.106       2.718       2.201       1.796       1.363       .697         12       3.055       2.681       2.179       1.782       1.356       .695         13       3.012       2.650       2.160       1.771       1.350       .694         14       2.977       2.624       2.145       1.761       1.345       .692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101       1.734       1.330       .688         20       2.845       2.528       2.086		3.707	3.143				and the second second second
9 3.250 2.821 2.262 1.833 1.383 .703  10 3.169 2.764 2.228 1.812 1.372 0.700  11 3.106 2.718 2.201 1.796 1.363 697  12 3.055 2.681 2.179 1.782 1.356 695  13 3.012 2.650 2.160 1.771 1.350 694  14 2.977 2.624 2.145 1.761 1.345 692  15 2.947 2.602 2.131 1.753 1.341 0.691  16 2.921 2.583 2.120 1.746 1.337 .690  17 2.898 2.567 2.110 1.740 1.333 689  18 2.878 2.552 2.101 1.734 1.330 688  19 2.861 2.539 2.093 1.729 1.328 688  20 2.845 2.539 2.093 1.729 1.328 688  20 2.845 2.528 2.086 1.725 1.325 0.687  21 2.831 2.518 2.080 1.721 1.323 686  22 2.819 2.508 2.074 1.717 1.321 686  23 2.807 2.500 2.069 1.714 1.319 685  24 2.797 2.492 2.064 1.711 1.318 685  26 2.779 2.479 2.056 1.706 1.315 684  26 2.779 2.479 2.056 1.706 1.315 684  27 2.763 2.467 2.048 1.701 1.313 683		3.499	2.598			The second of the second of	<ul> <li>A Market</li> </ul>
9 3.250 2.821 2.262 1.833 1.383 .703 10 3.169 2.764 2.228 1.812 1.372 0.700 11 3.106 2.718 2.201 1.796 1.363 697 12 3.055 2.681 2.179 1.782 1.356 695 13 3.012 2.650 2.160 1.771 1.350 694 14 2.977 2.624 2.145 1.761 1.345 692 15 2.947 2.602 2.131 1.753 1.341 0.691 16 2.921 2.583 2.120 1.746 1.337 690 17 2.898 2.567 2.110 1.740 1.333 689 18 2.878 2.552 2.101 1.734 1.330 688 19 2.861 2.539 2.093 1.729 1.328 688 19 2.861 2.539 2.093 1.729 1.328 688 20 2.845 2.528 2.086 1.725 1.325 0.687 21 2.831 2.518 2.086 1.725 1.325 0.687 22 2.819 2.508 2.074 1.717 1.321 686 22 2.819 2.508 2.074 1.717 1.321 686 23 2.807 2.500 2.069 1.714 1.319 685 24 2.797 2.492 2.064 1.711 1.318 685 25 2.787 2.492 2.064 1.711 1.318 685 26 2.779 2.479 2.056 1.706 1.315 684 27 2.763 2.467 2.048 1.701 1.313 683	8	3.355	- 2.896		化二十分烷 经转换税 安阳 化二		
11       3.106       2.718       2.201       1.796       1.363       .697         12       3.055       2.681       2.179       1.782       1.356       .695         13       3.012       2.650       2.160       1.771       1.350       .694         14       2.977       2.624       2.145       1.761       1.345       .692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101       1.734       1.330       .688         19       2.861       2.539       2.093       1.729       1.328       .688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       686         23       2.807       2.500       2.069       1.714       1.319       .685         24       2.797       2.485       2.060		3.250	2.821	2.262	1.833		.703
11       3.055       2.681       2.179       1.782       1.356       .695         13       3.012       2.650       2.160       1.771       1.350       .694         14       2.977       2.624       2.145       1.761       1.345       .692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101       1.734       1.530       .688         19       2.861       2.539       2.093       1.729       1.328       .688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       686         22       2.819       2.508       2.074       1.717       1.321       .686         23       2.807       2.500       2.069       1.714       1.319       .685         24       2.797       2.4492       2.064 <th>10</th> <th>3.169</th> <th>2.764</th> <th>2.228</th> <th>1.812</th> <th></th> <th></th>	10	3.169	2.764	2.228	1.812		
12       3.055       2.681       2.179       1.782       1.356       695         13       3.012       2.650       2.160       1.771       1.350       694         14       2.977       2.624       2.145       1.761       1.345       692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101       1.734       1.530       .688         19       2.861       2.539       2.093       1.729       1.328       .688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       .686         22       2.819       2.508       2.074       1.717       1.321       .686         23       2.807       2.500       2.069       1.714       1.318       .685         24       2.797       2.492       2.064		3.106	2.718	2.201			The state of the s
13       3.012       2.624       2.145       1.761       1.345       692         15       2.947       2.602       2.131       1.753       1.341       0.691         16       2.921       2.583       2.120       1.746       1.337       690         17       2.898       2.567       2.110       1.740       1.333       689         18       2.878       2.552       2.101       1.734       1.330       688         19       2.861       2.539       2.093       1.729       1.328       688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       686         22       2.819       2.508       2.074       1.717       1.321       686         23       2.807       2.500       2.069       1.714       1.319       685         24       2.797       2.492       2.064       1.711       1.318       685         25       2.787       2.485       2.060       1.706       1.315       684         27       2.779       2.479       2.056 <t< th=""><th></th><th>3.055</th><th>2.681</th><th>2.179</th><th>1.782</th><th></th><th></th></t<>		3.055	2.681	2.179	1.782		
15         2.947         2.602         2.131         1.753         1.341         0.691           16         2.921         2.583         2.120         1.746         1.337         690           17         2.898         2.567         2.110         1.740         1.333         689           18         2.878         2.552         2.101         1.734         1.530         688           19         2.861         2.539         2.093         1.729         1.328         688           20         2.845         2.528         2.086         1.725         1.325         0.687           21         2.831         2.518         2.080         1.721         1.323         686           22         2.819         2.508         2.074         1.717         1.321         686           23         2.807         2.500         2.069         1.714         1.319         685           5         24         2.797         2.492         2.064         1.711         1.318         685           25         2.787         2.485         2.060         1.708         1.316         0.684           26         2.779         2.479         2.056 </th <th>13</th> <th>3.012</th> <th>2.650</th> <th>2.160</th> <th></th> <th></th> <th></th>	13	3.012	2.650	2.160			
16       2.921       2.583       2.120       1.746       1.337       .690         17       2.898       2.567       2.110       1.740       1.333       .689         18       2.878       2.552       2.101       1.734       1.530       .688         19       2.861       2.539       2.093       1.729       1.328       .688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       .686         22       2.819       2.508       2.074       1.717       1.321       .686         23       2.807       2.500       2.069       1.714       1.319       .685         24       2.797       2.492       2.064       1.711       1.318       .685         25       2.787       2.485       2.060       1.708       1.316       0.684         26       2.779       2.479       2.056       1.706       1.315       684         27       2.2771       2.473       2.052       1.703       1.314       684         29       2.763       2.467       2.048	14	2.977	2.624	2.145	1.761	1.345	.692
16       2.921       2.583       2.120       1.746       1.337       690         17       2.898       2.567       2.110       1.740       1.333       689         18       2.878       2.552       2.101       1.734       1.530       688         19       2.861       2.539       2.093       1.729       1.328       688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       686         22       2.819       2.508       2.074       1.717       1.321       686         23       2.807       2.500       2.069       1.714       1.319       685         5       24       2.797       2.492       2.064       1.711       1.318       685         25       2.787       2.485       2.060       1.708       1.316       0.684         26       2.779       2.479       2.056       1.706       1.315       684         277       2.763       2.467       2.048       1.701       1.313       683         29       2.756       2.462       2	15	2.947	2.602	2.131	1.753		
17       2.878       2.552       2.101       1.734       1.330       .688         19       2.861       2.539       2.093       1.729       1.328       .688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       .686         22       2.819       2.508       2.074       1.717       1.321       .686         23       2.807       2.500       2.069       1.714       1.319       .685         24       2.797       2.492       2.064       1.711       1.318       .685         25       2.787       2.485       2.060       1.708       1.316       0.684         26       2.779       2.479       2.056       1.706       1.315       .684         27       2.763       2.467       2.048       1.701       1.313       .683         29       2.756       2.462       2.045       1.699       1.311       .683	医乳腺性溃疡 医多种性 医二甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基	2.921	2.583	2.120			
18       2.0%       2.539       2.093       1.729       1.328       688         20       2.845       2.528       2.086       1.725       1.325       0.687         21       2.831       2.518       2.080       1.721       1.323       686         22       2.819       2.508       2.074       1.717       1.321       686         23       2.807       2.500       2.069       1.714       1.319       685         24       2.797       2.492       2.064       1.711       1.318       685         25       2.787       2.485       2.060       1.708       1.316       0.684         26       2.779       2.479       2.056       1.706       1.315       684         27       2.771       2.479       2.052       1.703       1.314       684         29       2.763       2.467       2.048       1.701       1.313       683         29       2.756       2.462       2.045       1.699       1.311       683	17	2.898	2.567	en and a state of the contract of	A STATE OF THE PARTY OF THE PAR	and the second second	
20 2.845 2.528 2.086 1.725 1.325 0.687 21 2.831 2.518 2.080 1.721 1.323 686 22 2.819 2.508 2.074 1.717 1.321 686 23 2.807 2.500 2.069 1.714 1.319 685 24 2.797 2.492 2.064 1.711 1.318 685 25 2.787 2.485 2.060 1.708 1.316 0.684 20 2.779 2.479 2.056 1.706 1.315 684 21 22 277 2.479 2.056 1.706 1.315 684 22 2.771 2.473 2.052 1.703 1.314 684 28 2.763 2.467 2.048 1.701 1.313 683 29 2.756 2.462 2.045 1.699 1.311 683	18	2.878	2.552	나는 이 경험하는 지역이 되었다.		さついこう いっていりょうさつ	
21     2.831     2.518     2.080     1.721     1.323     686       22     2.819     2.508     2.074     1.717     1.321     686       23     2.807     2.500     2.069     1.714     1.319     685       5     24     2.797     2.492     2.064     1.711     1.318     685       25     2.787     2.485     2.060     1.708     1.316     0.684       26     2.779     2.479     2.056     1.706     1.315     684       27     2.771     2.473     2.052     1.703     1.314     684       29     2.763     2.467     2.048     1.701     1.313     683       29     2.756     2.462     2.045     1.699     1.311     683	. 19.	2.861	. 2.539	2.093	1.729	1.328	
22     2.819     2.508     2.074     1.717     1.321     686       23     2.807     2.500     2.069     1.714     1.319     685       24     2.797     2.492     2.064     1.711     1.318     685       25     2.787     2.485     2.060     1.708     1.316     0.684       26     2.779     2.479     2.056     1.706     1.315     684       27     2.771     2.473     2.052     1.703     1.314     684       28     2.763     2.467     2.048     1.701     1.313     683       29     2.756     2.462     2.045     1.699     1.311     683	20	2.845	2.528	2.086			
22     2.819     2.508     2.074     1.717     1.321     686       23     2.807     2.500     2.069     1.714     1.319     685       524     2.797     2.492     2.064     1.711     1.318     685       25     2.787     2.485     2.060     1.708     1.316     0.684       26     2.779     2.479     2.056     1.706     1.315     684       27     2.771     2.479     2.052     1.703     1.314     684       28     2.763     2.467     2.048     1.701     1.313     683       29     2.756     2.462     2.045     1.699     1.311     .683       30     3.2467     2.045     1.699     1.311     .683	the familiar in the profession of the first	2.831	2.518	The state of the s	1.721	and the second second second second	
24         2.797         2.492         2.064         1.711         1.318         685           25         2.787         2.485         2.060         1.708         1.316         0.684           26         2.779         2.479         2.056         1.706         1.315         684           27         2.771         2.479         2.052         1.703         1.314         684           28         2.763         2.467         2.048         1.701         1.313         683           29         2.756         2.462         2.045         1.699         1.311         683           30         3.2467         3.2462         3.045         1.445         1.080         674		2.819	2.508	2.074	1.717		
25     2.787     2.485     2.060     1.708     1.316     0.684       26     2.779     2.479     2.056     1.706     1.315     684       27     2.771     2.479     2.052     1.703     1.314     684       28     2.763     2.467     2.048     1.701     1.313     683       29     2.756     2.462     2.045     1.699     1.311     683       30     3.2462     2.045     1.699     1.311     683	23 / usig-23 / usig	2.807	2.500			and the second of the second o	
26     2.779     2.479     2.056     1.706     1.315     684       27     2.771     2.473     2.052     1.703     1.314     684       28     2.763     2.467     2.048     1.701     1.313     683       29     2.756     2.462     2.045     1.699     1.311     683       40     2.746     2.046     1.645     1.000     674	24	2.797	2.492	2.064	1.711	·特殊的公司的特殊。	
27 2.771 2.479 2.052 1.703 1.314 684 28 2.763 2.467 2.048 1.701 1.313 683 29 2.756 2.462 2.045 1.699 1.311 683	25	2.787	2.485	2.060	the same of the same of the same of the same of	and the state of t	والمعترفة ومراجيها والأكثر أوارثور لاحر
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Taron 1 2.576 2.326 1.960 1.645 1.282 674	329	2.756	2.462	2.045	1.699	1.311	.683
的 <b>对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对对</b>	Large	2.576	步 (2.326)。	1.960	1.645	1,282	.674