

THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF BASIC SCIENCES
ACADEMIC YEAR 2018/2019 – SEMESTER I



BACHELOR OF SCIENCE HONOURS IN NURSING
BSU5335 – HEALTH STATISTICS - LEVEL 5
FINAL EXAMINATION

DURATION: THREE HOURS

DATE: 1st MARCH 2019

TIME: .09.30 AM – 12.30 PM

Part B – Essay Questions

(80 marks)

1.

a)

- i. Define the terms descriptive statistic and inferential statistic?
- ii. Write down 2 measures of central tendency and 2 measures of dispersion.
- iii. List four scales of measurement.

(10 marks)

b) Blood groups of 200 people are distributed as follows. 60 of them have blood group type A, 58 have type B, 70 have type O and 12 have type AB.

- i. Construct a frequency table for the blood group types
- ii. If a person is randomly selected from this group, calculate the probability that he/she has blood group,
 - a) type A
 - b) type B
 - c) type AB
 - d) type O
- iii. Calculate the probability that a randomly selected person has blood group type A or type O.
- iv. If 3(three) people are randomly selected, find the probability that all of them will have blood group type O.

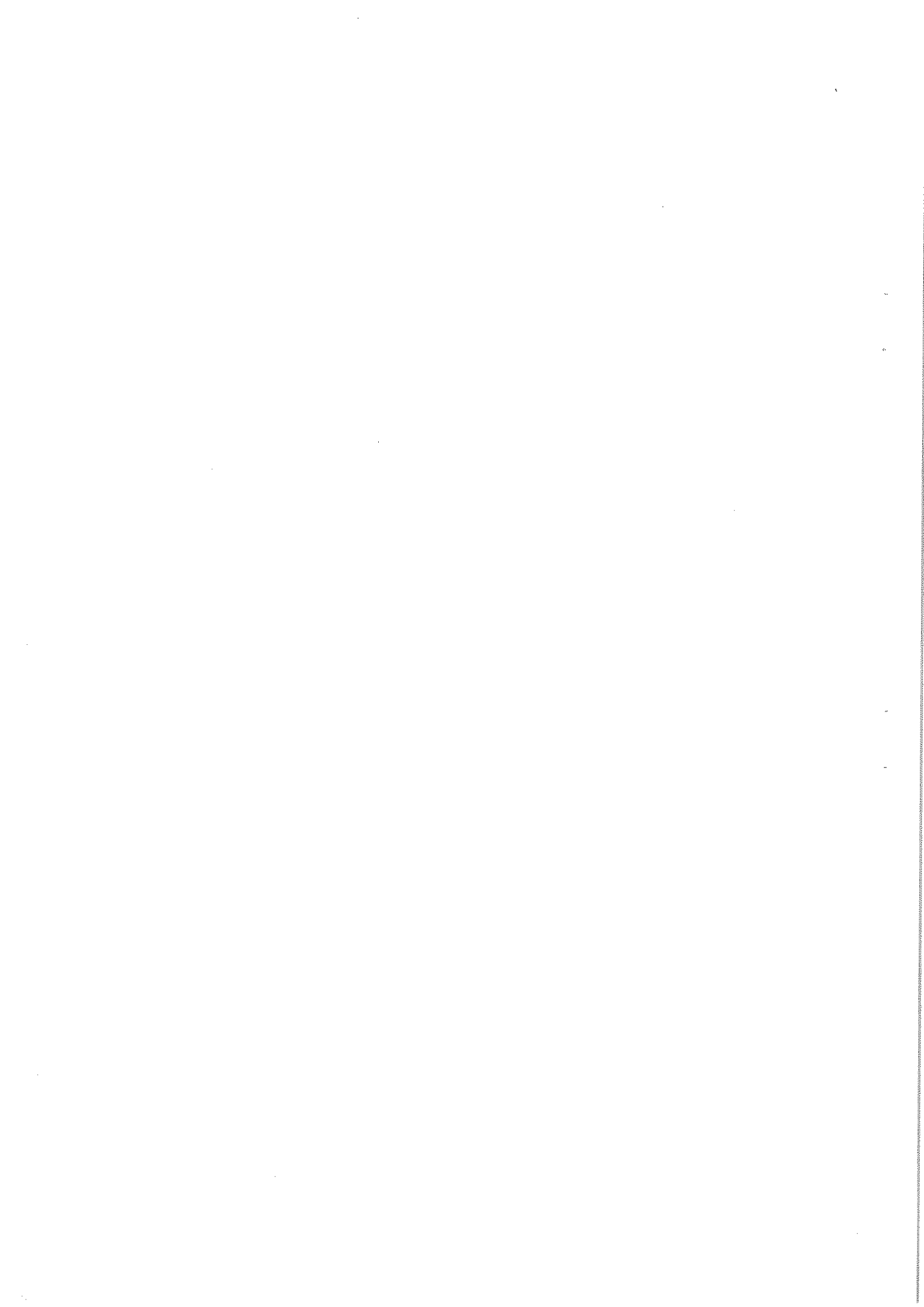
(10 marks)

2.

a)

- i. What is the difference between Probability sampling methods and Non-probability sampling methods?
- ii. Write one advantage and one disadvantage of each of the methods mentioned above.
- iii. Name 2(two) non-probability sampling methods and briefly explain each of them.

(10 marks)



b) A nutritionist wants to determine the prevalence of malnutrition among pre-school children in Sri Lanka. A sample of 1000 children is required for this study.

- i. Suggest a suitable sampling method. Justify your answer.
- ii. If there are 167 malnourished children in the sample, estimate the proportion of malnourished children in the population.
- iii. Calculate the standard error of the proportion. (answer should be correct up to 3 decimal places)
- iv. Calculate 95% confidence interval for the population proportion. ($z = 1.96$)

(10 marks)

3.

a)

- i. Explain the difference between qualitative research and quantitative research methods?
- ii. Write down 2(two) qualitative research methods and 2(two) quantitative research methods.
- iii. Write any 4 (four) steps that are considered in a research process.

(10 marks)

b) An investigator conducted a study to determine whether there is an association between pancreatic cancer and smoking status. The study was carried out with 200 individuals with cancer and 200 individuals without cancer. In the group of individuals with cancer, 80% reported that they smoked and in the other group (without a cancer), 50% reported that they smoked.

- i. What is the type of the study?
- ii. Prepare a 2x2 table for the above data.
- iii. Compute the odd ratio (OR).
- iv. Interpret the OR value that you obtained in part iii.
- v. Determine whether smoking is a risk factor or not. Give the reason.

(10 marks)

4.

- a) A researcher wants to test whether the mean systolic blood pressure of hypertensive patients is different from that of the normals. He randomly selected 100 hypertensive patients from a hospital and their average systolic blood pressure was measured as 150 mmHg. (Normal systolic blood pressure is 120 mmHg and Standard deviation is 40 mmHg) Assuming the systolic blood pressure of hypertensive patients are normally distributed, answer the following questions.

- i. State the hypotheses to be tested.
- ii. Name a suitable parametric statistical test to test the above hypothesis.
- iii. Give the reason for above selection in part ii.
- iv. Test the hypothesis at 5% significance level. What is the conclusion?

(10 marks)

- b) A medical researcher wants to test whether there is any significant difference in blood cholesterol levels (mg/100ml) of heart patients after five days and ten days following a heart attack. Blood cholesterol levels of 10 heart patients at five days and ten days after the attack are given in the table below.

Patient	1	2	3	4	5	6	7	8	9	10
After 5 days	155	167	172	150	201	285	305	165	235	288
After 10 days	187	172	200	198	182	246	285	172	230	245

- i. State the hypotheses to be tested.
- ii. Name a suitable non-parametric statistical test to test the above hypothesis.
- iii. Test the null hypothesis at 5% of significance level.
- iv. What is the conclusion according to the results that you obtained in part ii?
- v. What is the alternative parametric statistical test that can be used to test the above hypothesis?

(10 marks)

Necessary Formulae

The following equations are given in the usual/ standard notation.

Standard Error

$$SE(\bar{x}) = \frac{SD}{\sqrt{n}}$$

$$SE(p) = \sqrt{\frac{pq}{n}}$$

Confidence intervals

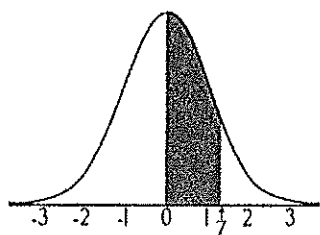
$$\bar{x} \pm z \frac{SD}{\sqrt{n}}$$

$$p \pm z \sqrt{\frac{pq}{n}}$$

Test statistic

$$Z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$$

$$t = \frac{\bar{x} - \mu_0}{SD/\sqrt{n}}$$



STANDARD NORMAL TABLE (Z)

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean (0) and z is 0.3944.

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998

t distribution table

df/p	0.40	0.25	0.10	0.05	0.025	0.01	0.005	0.0005
1	0.324920	1.000000	3.077684	6.313752	12.70620	31.82052	63.65674	636.6192
2	0.288675	0.816497	1.885618	2.919986	4.30265	6.96456	9.92484	31.5991
3	0.276671	0.764892	1.637744	2.353363	3.18245	4.54070	5.84091	12.9240
4	0.270722	0.740697	1.533206	2.131847	2.77645	3.74695	4.60409	8.6103
5	0.267181	0.726687	1.475884	2.015048	2.57058	3.38493	4.03214	6.8688
6	0.264835	0.717558	1.439756	1.943180	2.44691	3.14267	3.70743	5.9588
7	0.263167	0.711142	1.414924	1.894579	2.36462	2.99795	3.49948	5.4079
8	0.261921	0.706387	1.396815	1.859548	2.30600	2.89646	3.35539	5.0413
9	0.260955	0.702722	1.383029	1.833113	2.26216	2.82144	3.24984	4.7809
10	0.260185	0.699812	1.372184	1.812461	2.22814	2.76377	3.16927	4.5869
11	0.259556	0.697445	1.363430	1.795885	2.20099	2.71808	3.10581	4.4370
12	0.259033	0.695483	1.356217	1.782288	2.17881	2.68100	3.05454	4.3178
13	0.258591	0.693829	1.350171	1.770933	2.16037	2.65031	3.01228	4.2208
14	0.258213	0.692417	1.345030	1.761310	2.14479	2.62449	2.97684	4.1405
15	0.257885	0.691197	1.340606	1.753050	2.13145	2.60248	2.94671	4.0728
16	0.257599	0.690132	1.336757	1.745884	2.11991	2.58349	2.92078	4.0150
17	0.257347	0.689195	1.333379	1.739607	2.10982	2.56693	2.89823	3.9651
18	0.257123	0.688364	1.330391	1.734064	2.10092	2.55238	2.87844	3.9216
19	0.256923	0.687621	1.327728	1.729133	2.09302	2.53948	2.86093	3.8834
20	0.256743	0.686954	1.325341	1.724718	2.08596	2.52798	2.84534	3.8495
21	0.256580	0.686352	1.323188	1.720743	2.07961	2.51765	2.83136	3.8193
22	0.256432	0.685805	1.321237	1.717144	2.07387	2.50832	2.81876	3.7921
23	0.256297	0.685306	1.319460	1.713872	2.06866	2.49987	2.80734	3.7676
24	0.256173	0.684850	1.317836	1.710882	2.06390	2.49216	2.79694	3.7454
25	0.256060	0.684430	1.316345	1.708141	2.05954	2.48511	2.78744	3.7251
26	0.255955	0.684043	1.314972	1.705618	2.05553	2.47863	2.77871	3.7066
27	0.255858	0.683685	1.313703	1.703288	2.05183	2.47266	2.77068	3.6896
28	0.255768	0.683353	1.312527	1.701131	2.04841	2.46714	2.76326	3.6739
29	0.255684	0.683044	1.311434	1.699127	2.04523	2.46202	2.75639	3.6594
30	0.255605	0.682756	1.310415	1.697261	2.04227	2.45726	2.75000	3.6460
z	0.253347	0.674490	1.281552	1.644854	1.95996	2.32635	2.57583	3.2905
CI	————	————	80%	90%	95%	98%	99%	99.9%

Wilcoxon Sign Rank table

N	Two-Tailed Significance Level		
	0.05	0.02	0.01
6	0	-	-
7	2	0	-
8	4	2	0
9	6	3	2
10	8	5	3
11	11	7	5
12	14	10	7
13	17	13	10
14	21	16	13
15	25	20	16
16	30	24	20
17	35	28	23
18	40	33	28
19	46	38	32
20	52	43	38
21	59	49	43
22	66	56	49
23	73	62	55
24	81	69	61

Wilcoxon Rank-Sum table

n_A	n_B	Lower Tail					Upper Tail						
		<i>prob</i>					<i>prob</i>						
		.005	.01	.025	.05	.10	.20	.20	.10	.05	.025	.01	.005
4	4			10	11	13	14	22	23	25	26		
5	5		10	11	12	14	15	25	26	28	29	30	
6	6	10	11	12	13	15	17	27	29	31	32	33	34
7	7	10	11	13	14	16	18	30	32	34	35	37	38
8	8	11	12	14	15	17	20	32	35	37	38	40	41
9	9	11	13	14	16	19	21	35	37	40	42	43	45
10	10	12	13	15	17	20	23	37	40	43	45	47	48
11	11	12	14	16	18	21	24	40	43	46	48	50	52
12	12	13	15	17	19	22	26	42	46	49	51	53	55
5	5	15	16	17	19	20	22	33	35	36	38	39	40
6	6	16	17	18	20	22	24	36	38	40	42	43	44
7	7	16	18	20	21	23	26	39	42	44	45	47	49
8	8	17	19	21	24	25	28	42	45	47	49	51	53
9	9	18	20	22	24	27	30	45	48	51	53	55	57
10	10	19	21	23	26	28	32	48	52	54	57	59	61
11	11	20	22	24	27	30	34	51	55	58	61	63	65
12	12	21	23	26	28	32	36	54	58	62	64	67	69
6	6	23	24	26	28	30	33	45	48	50	52	54	55
7	7	24	25	27	29	32	35	49	52	55	57	59	60
8	8	25	27	29	31	34	37	53	56	59	61	63	65
9	9	26	28	31	33	36	40	56	60	63	65	68	70
10	10	27	29	32	35	38	42	60	64	67	70	73	75
11	11	28	30	34	37	40	44	64	68	71	74	78	80
12	12	30	32	35	38	42	47	67	72	76	79	82	84
7	7	32	34	36	39	41	45	60	64	66	69	71	73
8	8	34	35	38	41	44	48	64	68	71	74	77	78
9	9	35	37	40	43	46	50	69	73	76	79	82	84
10	10	37	39	42	45	49	53	73	77	81	84	87	89
11	11	38	40	44	47	51	56	77	82	86	89	93	95
12	12	40	42	46	49	54	59	81	86	91	94	98	100
8	8	43	45	49	51	55	59	77	81	85	87	91	93
9	9	45	47	51	54	58	63	82	86	90	93	97	99
10	10	47	49	53	56	60	65	87	92	96	99	103	105
11	11	49	51	55	59	63	68	91	97	101	105	109	111
12	12	51	53	58	62	66	72	96	102	106	110	115	117
9	9	56	59	62	66	70	75	96	101	105	109	112	115
10	10	58	61	65	69	73	78	102	107	111	115	119	122
11	11	61	63	68	72	76	82	107	113	117	121	126	128
12	12	63	66	71	75	80	86	112	118	123	127	132	135
10	10	71	74	78	82	87	93	117	123	128	132	136	139
11	11	73	77	81	86	91	97	123	129	134	139	143	147
12	12	76	79	84	89	94	101	129	136	141	146	151	154
11	11	87	91	96	100	106	112	141	147	153	157	162	166
12	12	90	94	99	104	110	117	147	154	160	165	170	174
12	12	105	109	115	120	127	134	166	173	180	185	191	195