

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc/B.Ed Degree Programme

Applied Mathematics – Level 03

ADE3200 – Applied Calculus I

OPEN BOOK TEST (OBT) – 2024/2025

DURATION: ONE (01) HOUR



008

Date: 01.09.2024.

Time: 1.00 p.m.- 2.00 p.m.

ANSWER ALL QUESTIONS.

1. a) Derive the equation of a **quadratic function** $f(x)$, whose graph has the following characteristics:

- It **opens down** and **stretched** by a factor of 2;
- Its **axis of symmetry** is the line $x = 1$;
- It passes through the point $(4, -2)$.

[60 marks]

b) Clearly stating the steps involved, and using suitable transformations of functions, sketch the graph of the quadratic function $f(x)$ derived in part a).

[40 marks]

[Total 100 marks]

2. Consider the function $f(x) = \frac{x-3}{x^2+x-2}$.

a) Sketch the graph of the rational function $f(x)$.

[40 marks]

b) Find the domain and the range of $f(x)$.

[20 marks]

c) Write the equation(s) of the vertical asymptote(s).

[20 marks]

d) Find $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$.

[20 marks]

[Total 100 marks]
