



SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER TWO
END OF SEMESTER EXAMINATION ALTERNATE

COURSE CODE : MAT 142
COURSE TITLE : Algebra Essentials
LECTURER : Pascalina Stanislas-Inglis, Antonia
Laurent Goodman
DATE :
TIME : 9
DURATION : 2 hours
STUDENT ID # : _____

GENERAL INFORMATION AND INSTRUCTIONS

- Students must sign **IN** and **OUT** on the examination class list.
- Write your ID number on the question paper.
- There are seven (7) questions in this exam. Answer all questions in the spaces provided.
- Use blue or black pen.
- Non-programmable calculators are permitted.

Question	Student's mark	Moderated Mark	Max Score
1			16
2			6
3			8
4			7
5			12
6			10
7			17
TOTAL			76

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Instruction: Answer all questions in the space provided.

1. Given that $f(x) = 2x^3 + ax^2 + bx - 3$ gives a remainder of -15 when divided by $(x - 2)$. Given also that $(x + 1)$ is a factor of $f(x)$,

(a) Find the values of a and b [9]

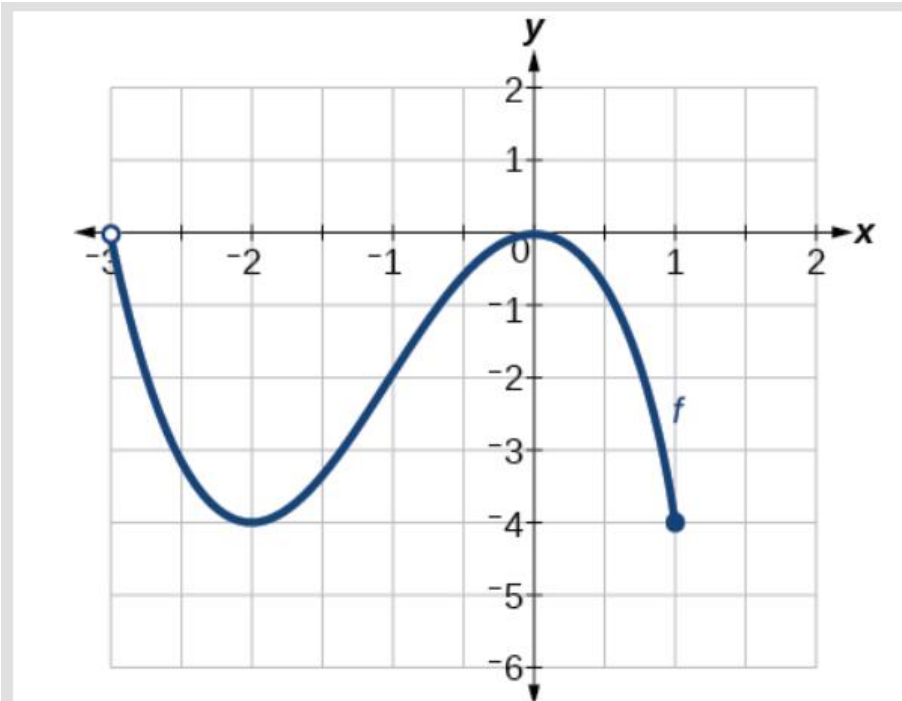
(b) Hence, using algebra, write $f(x)$ as a product of three linear factors [4]

(c) Solve $f(x) = 0$ [3]

2. Given the function $f(x) = x^2 + 2x$
- (a) Find the average rate of change of $f(x)$ on the interval $[2, 2+h]$ in simplest form. [6]

- (b) Hence or otherwise determine the average rate of change of $f(x)$ in the interval $[2, 4]$. [2]

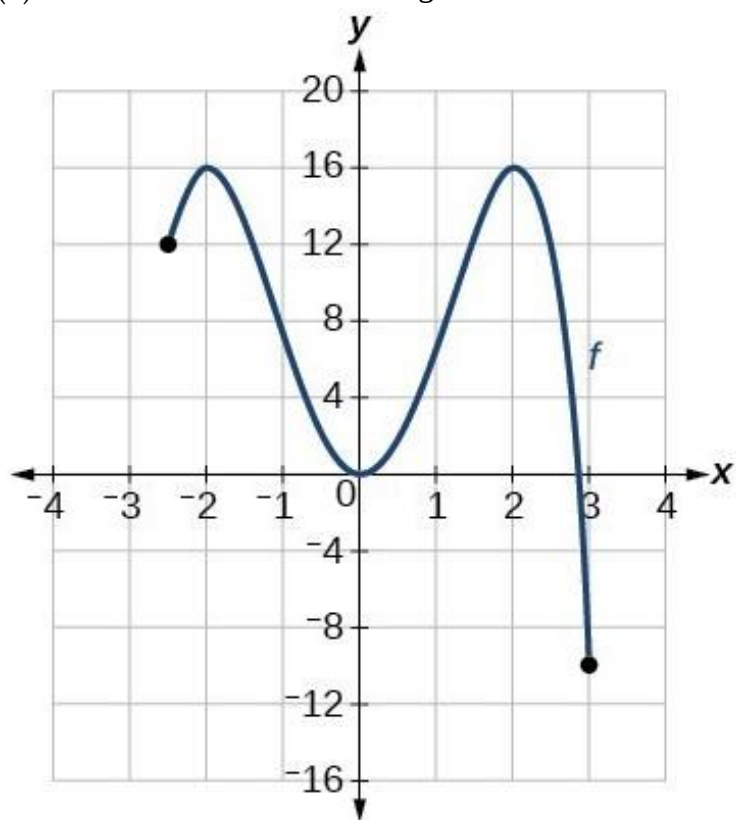
3. (a) From the diagram below state the domain and range of the function graphed above, using interval notation.



Domain _____ [2]

Range _____ [2]

(b) Given the function in the image below



Identify

I. Local minimum _____

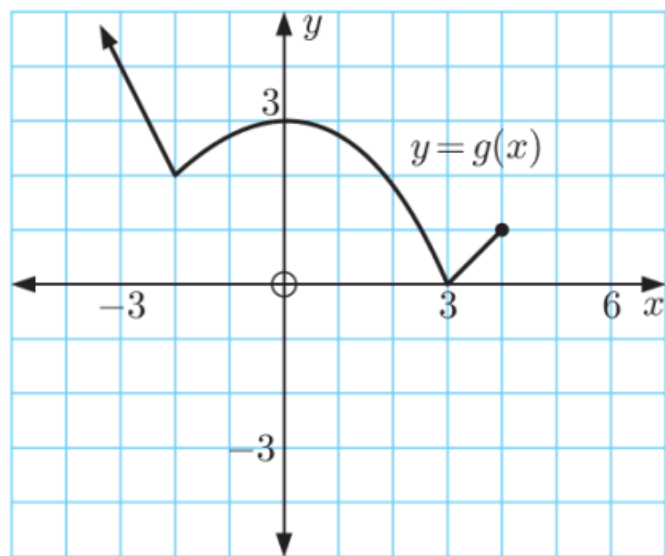
[1]

II. Interval where the function is increasing. Give your answer in interval notation

_____ [2]

III. Absolute minimum point. _____ [2]

4. The following is the graph of $g(x)$



a) On the graph above draw clearly the graph of $g(x) - 3$ [2]

b) Describe the transformation of $g(x)$ to $h(x) = -\frac{1}{2}g(x+2) - 1$ [3]

c) The point $(-2, 2)$ on $g(x)$ is transformed to $(_, _)$ on $h(x)$ [2]

5. Given are the functions $f(x) = 3x + 1$, $g(x) = 2x^2$ and $h(x) = \frac{2x-3}{x+2}$ $x \neq -2$

(i) Find a simplified expression for the composite function $fg(x)$ [2]

(ii) Hence, solve $fg(x) = f(x)$ [5]

(iii) Determine $h^{-1}(x)$ [4]

6. Solve the following

a) $3|x - 8| + 4 = 25$ [5]

b) $|2x + 5| < 5$ (represent your answer on a number line) [5]

7. The value \$V of a certain model of car, t years after it was purchased is given by

$$V = Be^{-kt}, t \geq 0, \text{ where B and k are positive constants.}$$

The value of the car when new was \$84,000 and after 5 years it dropped to \$20,160.

(i) Show that $k = 0.2854$, correct to 4 significant figures [4]

(ii) How long (t) will it take for the value of the car to reach \$7000 [5]

(b) Solve the following:

(i) $64^{3x-1} = \frac{1}{4}$ [4]

(ii) $2\log_3(x) - \log_3(x - 2) = 2$ [4]

END OF EXAMINATION