

Saigon International College
Department of Mathematics and Science
Semester 1, 2022
Year 11 Mathematics Methods ATAR
Test 1

Section One (Calculator Free)

17

Time Allowed : (5+25) minutes

Total marks available: 35

Name of student: .. Chu. Minh. Dang... MA

Attempt all questions.

Question 1

(8 marks)

Solve the following equations for x .

(a) $x^2 + 24x - 25 = 0$.

(2 marks)

(b) $(x - 2)^2 - 1 = x + 3$

. (3 marks)

(c) $x^3 + 4x^2 + x - 6 = 0$.

(3 marks),

Question 3
(a) Sketch the

Question 2

(5 marks)

The point $(3, 4)$ is the midpoint of point $(-1, 5)$ and point S .

(a) Determine the coordinates of point S .

(2 marks)

(b) Determine the equation of the straight line that passes through point $(2, -1)$ and is perpendicular to the line through points R and M .

(3 marks)

Question 4

(4 marks)

State the domain and corresponding range for the following functions.

(a) $F(x) = 5 + x^2$

(b) $G(x) = \sqrt{x - 4}$

Question 5**(4 marks)**

Consider the line $2x + by = c$ where c is a constant.

(a) Find b if the line has gradient - 4.

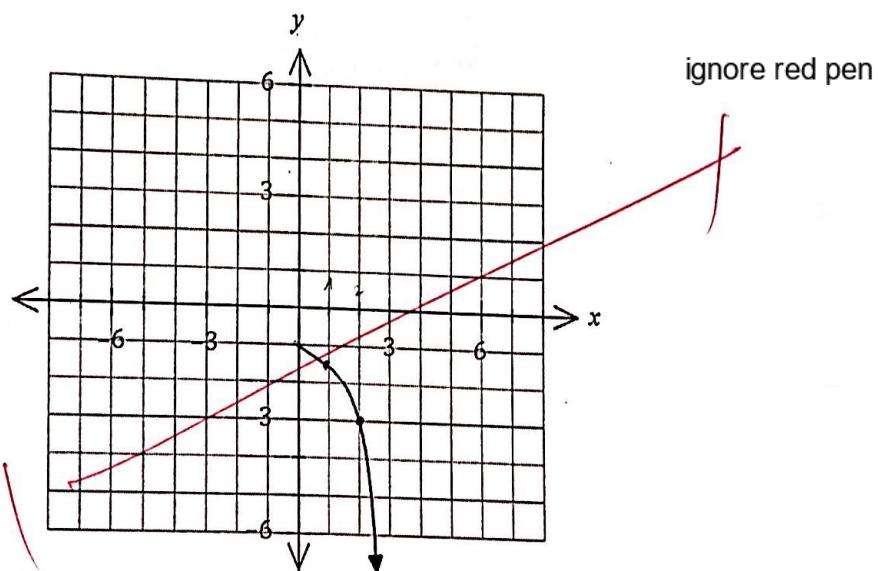
(2 marks)

(b) Find the c if this line has an X-intercept of 6.

(2 marks)

Question 6

(7 marks)

(a) The variable P is inversely proportional to the variable t , so that when $t = 2.4$, $P = 20$.(i) Explain how P will change as t decreases. (1 mark)(ii) Determine t when $P = 6$. (2 marks)(c) Part of the graph of $y = \frac{a}{x-3}$ is drawn below.1. (i) Determine the value of a . (1 mark)

2. (ii) Draw the remainder of the graph. (3 marks)

End of section one

Section Two (Calculator Assumed)

Time Allowed: (5 + 55) minutes

marks

Total Mark available: 51

Student's Name: ... Chv... Minh Phu MA

35

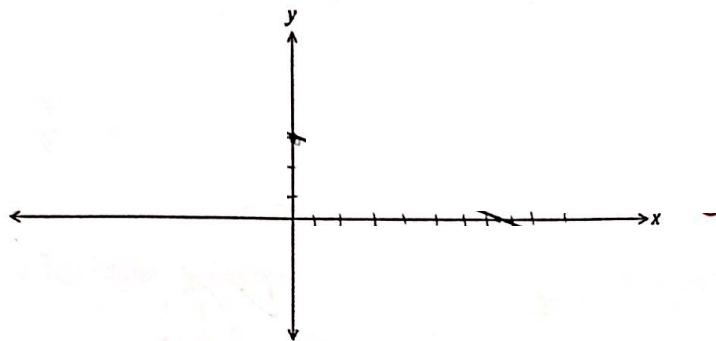
Question 7

(6 marks)

The variables x and y are related by the equation $2x + 5y = 15$.

(a) Sketch the graph of this relationship.

(2 marks)



(b) Express y in terms of x and briefly explain why y is a function of x . (2 marks)

(c) The domain of x is restricted to $5 \leq x < 10$. State the range of y . (2 marks)

Question 8

(6 marks)

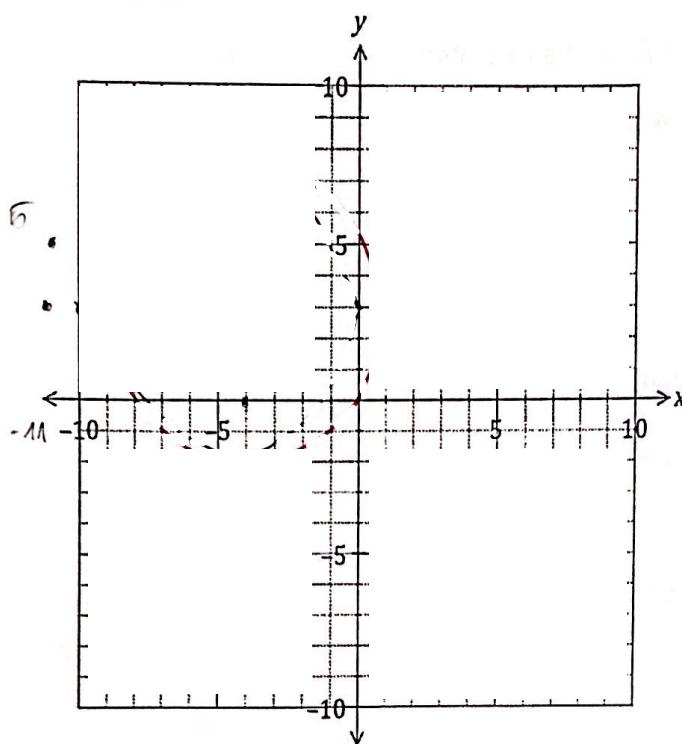
- (a) The points A and B have coordinates $(4, -6)$ and $(5, 8)$ respectively. If B is the midpoint of A and C , determine the coordinates of C . (3 marks)

- (b) The points D and E have coordinates $(5p, -q)$ and $(2q, 3p)$ respectively, where p and q are constants. Determine the value of p and the value of q if the midpoint of D and E is at $(21, 17)$.

Question 9**(6 marks)**(a) The variables x and y are related by $(x + 4)^2 + (y - 3)^2 = 25$.

(i) Sketch the graph of this relationship.

(3 marks)



answer hidden

(ii) How does the vertical line test indicate that y is not a function of x ?

(1 mark)

(b) The graph of $(x + 4)^2 + (y - 3)^2 = 25$ that you made in (a) is moved left 7 units and up 2 units. What will be the equation of the graph in its new location?

(2 marks)

Question 10

(6 marks)

The graph $y = f(x)$, where $f(x) = x^2 + bx + c$ has a turning point at $(-2, -1)$.

(a) State the equation of the line of symmetry for the graph of $y = f(x)$. (1 mark)

(b) Determine the value of the constant b and the value of the constant c . (3 marks)

(c) The graph of $y = f(x)$ is translated 3 units to the right and 5 units upwards. Determine the equation of the resulting curve. (2 marks)

Question 11

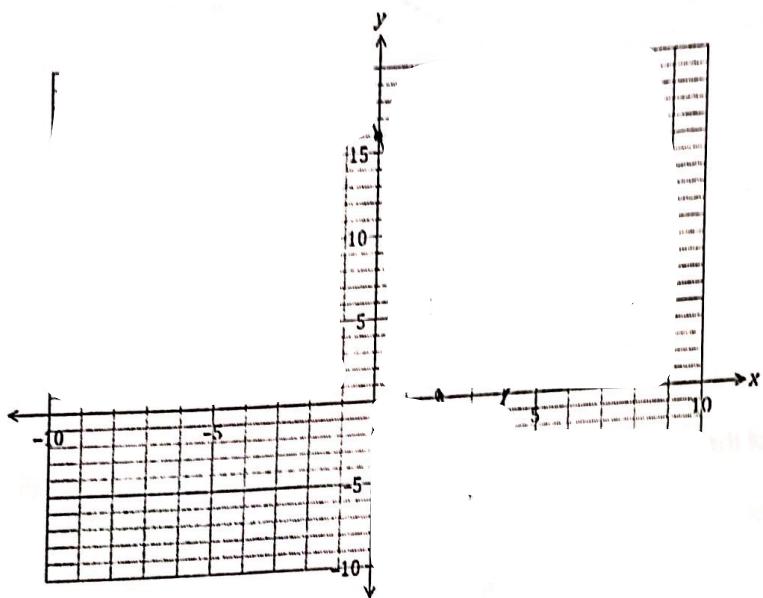
(8 marks)

(a) The graph of $y = 2x^2 + bx + 16$ has a line of symmetry with equation $x = 3$.

i. Determine the value of b .

(2 marks)

ii. Draw the graph of the parabola on the axis below. **(3 marks)**



answ er hidden

(b) One of the solutions to the equation $2x^3 + 21x^2 + cx - 495 = 0$ is $x = 5$. Determine the value of c and all other solutions. **(3 marks)**

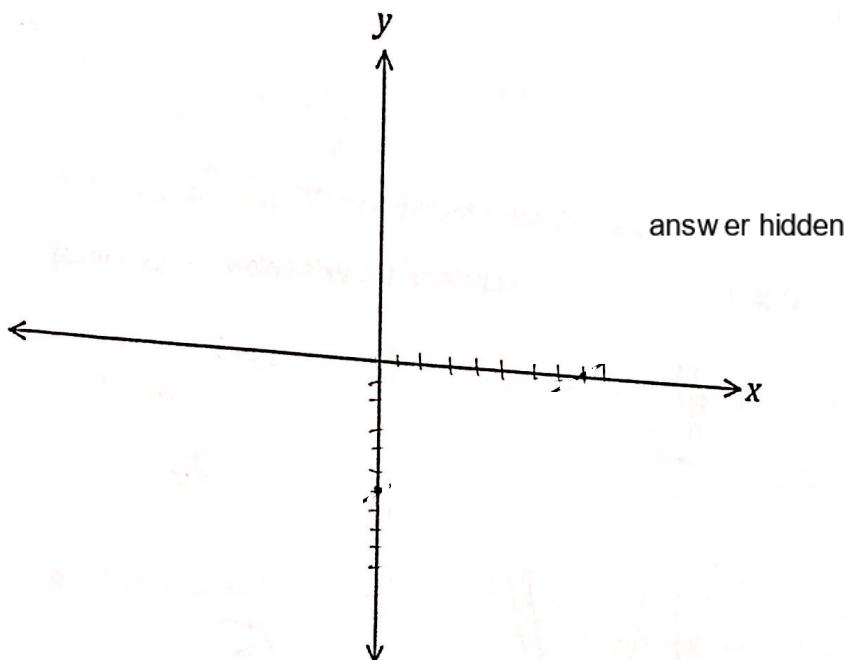
Question 12

(6 marks)

Line L_1 has equation $3x - 4y = 24$.

(a) Sketch the graph of L_1 .

(2 marks)



answer hidden

(b) Determine the equation of the line L_2 that is parallel to L_1 and passes through the point with coordinates $(-2, -3)$.

(2 marks)

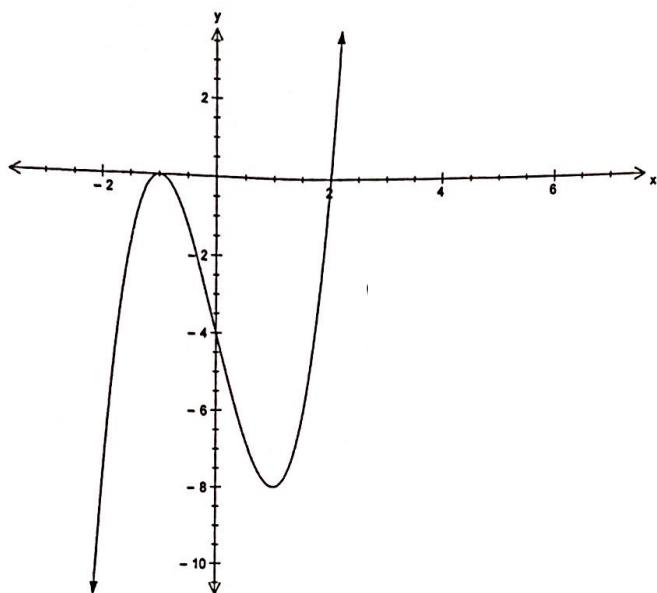
(c) Determine the equation of the line L_3 that is perpendicular to L_1 and has the same y intercept as L_1 .

(2 marks)

Question 13**(13 marks)**

- (a) The equation of the graph below is $f(x) = ax^3 + bx - 4$.

- (i) Determine the values of a and b .

(3 marks)

- (ii) Use the graph above to state the possible k values such that $f(x) = k$ has only 2 solutions.

(2 marks)

- (b) (i) Show that $(x+2)$ is a linear factor of the cubic equation $x^3 - 3x^2 - 3x + 14 = 0$.

(2 marks)

(i) Express the cubic in the form $x^3 - 3x^2 - 3x + 14 = (x+2)(x^2 + ax + b)$ evaluating the coefficients a and b (2 marks)

(iii) Hence, state the number of real root(s) of the function $f(x) = x^3 - 3x^2 - 3x + 14$.

Justify your answer using the discriminant, $\Delta = b^2 - 4ac$. (4 marks)

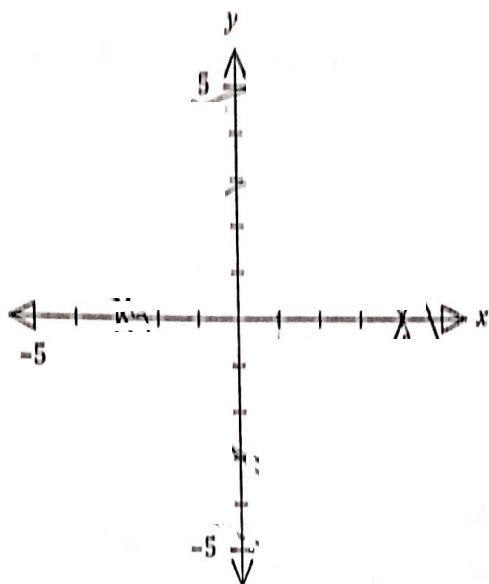
End of Section Two

Question 3

(7 marks)

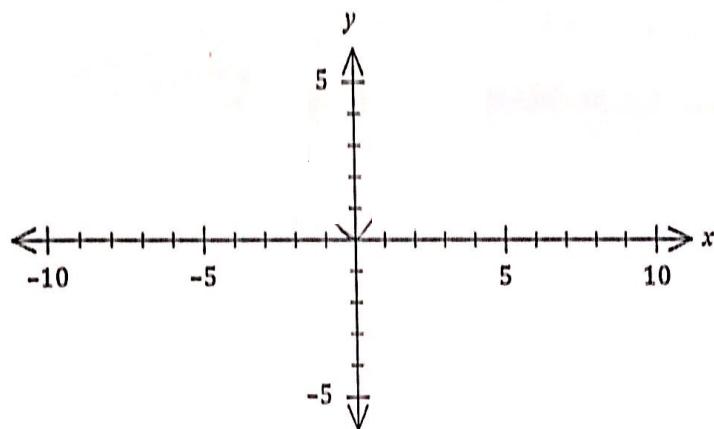
(a) Sketch the graph of $(x-1)^2 + (y+1)^2 = 4$ on the axes below.

(3 marks)



(b) Sketch the graph of $y^2 = x$ on the axes below.

(2 marks)



(c) Explain whether y is a function of x in the relationship graphed in (b).

(2 marks)