This Is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 01

06NOV2023

Do NOT write in this box. Your MARK will be placed here.

Subject :	A Level : Maths M1Pure	
Class :	11A and 12A	
Teacher :	Mrs. Claudine Eid	
Duration :	40 minutes	
Calculators are allowed		
Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Answer ALL questions. Write your answers in the space provided

1) Solve the following system $x(x-3) \geq 28$

$-x+3 > 2x-6$

(4)

(Total for Question 1 is 4 marks)

2. (*a*) Find, using algebra, all real solutions of

$$2x^3 + 3x^2 - 35x = 0$$

(3)

(*b*) Hence find all real solutions of

$$2(y-5)^6 + 3(y-5)^4 - 35(y-5)^2 = 0$$

(4)

(Total for Question 2 is 7 marks)

Continue 2

3. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

Figure 1 shows a line l with equation $x + y = 6$ and a curve C with equation $y = 6x - 2x^2 + 1$

The line l intersects the curve C at the points P and Q as shown in Figure 1.

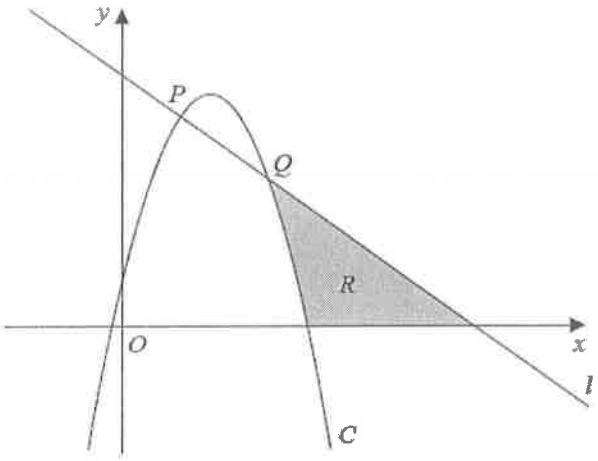


Figure 1

(*a*) Find, using algebra, the coordinates of P and the coordinates of Q.

(4)

The region R, shown shaded in Figure 1, is bounded by C, l and the x-axis.

(*b*) Use inequalities to define the region R.

(3)

(Total 7 marks)

Continue 3

4. The straight line l has equation $y = k(2x - 1)$, where k is a constant.

The curve C has equation $y = x^2 + 2x + 11$

Find the set of values of k for which l does not cross or touch C.

(6)

(Total 6 marks)

Continue 4

5. $f(x) = 11 - 4x - 2x^2$

(*a*) Express $f(x)$ in the form

$$a + b(x + c)^2$$

where a, b and c are integers to be found.

(3)

(*b*) *Give* clearly the coordinates

of the point where the curve crosses the y-axis.

(2)

(*c*) Write down the equation of the line of symmetry of C.

(1)

(Total 6 marks)

Continue 5

TOTAL FOR PAPER IS 30 MARKS

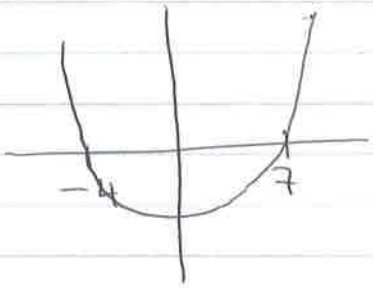
Answer ALL questions. Write your answers in the space provided

1) Solve the following system $x(x-3) \geq 28$
$-x+3 > 2x-6$

(4)

$x^2 - 3x - 28 \geqslant 0$

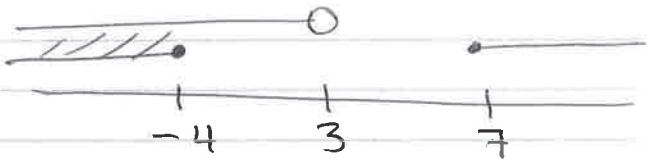
$(x-7)(x+4) \geqslant 0$ [1]
$7 \quad -4$



$x \leqslant -4$ or $x \geqslant 7$ [1]

$-3x > -9$

$x < 3$ [1]



$x \leqslant -4$ [1]

(Total for Question 1 is 4 marks)

2. (*a*) Find, using algebra, all real solutions of

$$2x^3 + 3x^2 - 35x = 0$$

(3)

(*b*) Hence find all real solutions of

$$2(y-5)^6 + 3(y-5)^4 - 35(y-5)^2 = 0$$

(4)

(Total for Question 2 is 7 marks)

a. $x(2x^2 + 3x - 35) = 0$

$x = 0$ or $\Delta = (3)^2 - 4(2)(-35)$

$= 289$ [1]

$x_1 = \frac{-3 - \sqrt{289}}{4} = -5$ [1]

$x_2 = \frac{-3 + \sqrt{289}}{4} = \frac{7}{2}$ [1]

b. let $(y-5)^2 = x$ [1]

$\Rightarrow 2x^3 + 3x^2 - 35x = 0$

$(y-5)^2 = 0$

$\Rightarrow y = 5$ [1]

$(y-5)^2 = -5$ [1]

no values for y

$(y-5)^2 = \frac{7}{2}$

$y-5 = \pm\sqrt{\frac{7}{2}}$ [1]

$y = \pm\sqrt{\frac{7}{2}} + 5$

3. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

Figure 1 shows a line l with equation $x + y = 6$ and a curve C with

equation $y = 6x - 2x^2 + 1$

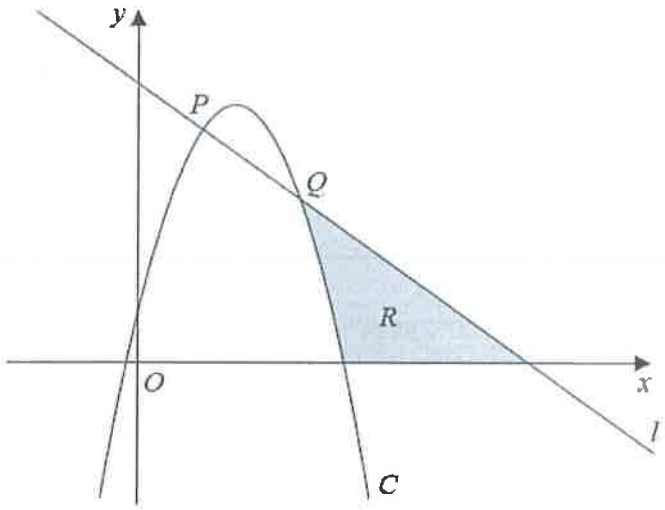


Figure 1

The line l intersects the curve C at the points P and Q as shown in Figure 1.

(*a*) Find, using algebra, the coordinates of P and the coordinates of Q.

(4)

The region R, shown shaded in Figure 1, is bounded by C, l and the x-axis.

(*b*) Use inequalities to define the region R.

(3)

(Total 7 marks)

a. $y = 6 - x$

$y = 6x - 2x^2 + 1$

$y = y \Rightarrow 6 - x = 6x - 2x^2 + 1$

11

Continue 3

$2x^2 - 7x + 5 = 0$ [1]

$(2x-5)(x-1) = 0$

$x = \frac{5}{2}$ or $x = 1$

$\Rightarrow y = 6 - x$

$y = 6 - \frac{5}{2} = \frac{7}{2}$

$y = 6 - 1$

$y = 5$

$P(1, 5)$ [1]

$Q\left(\frac{5}{2}, \frac{7}{2}\right)$ [1]

b. $y \geq 0$ [1]

$y \leq 6 - x$ [1]

$y \geq 6x - 2x^2 + 1$ [1]

y	$6 - x$
0	$6 - 0$

$0 \leq 6$

$y \leq 6 - x$

$y = 6x - 2x^2 + 1$

y	$6x - 2x^2 + 1$
0	$0 - 0 + 1$

$0 \geq 1$

origin $(0, 0)$

4. The straight line l has equation $y = k(2x - 1)$, where k is a constant.

The curve C has equation $y = x^2 + 2x + 11$

Find the set of values of k for which l does not cross or touch C.

(6)

(Total 6 marks)

$y = 2xk - k$

$y = x^2 + 2x + 11$

$y = y \Rightarrow x^2 + 2x + 11 = 2xk - k$ [1]

$x^2 + x(2 - 2k) + 11 + k = 0$ [1]

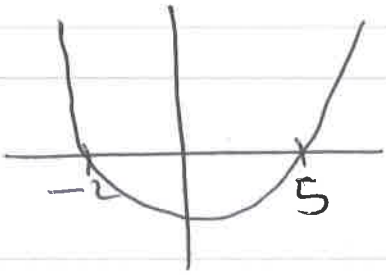
$\Delta < 0$ [1]

$(2 - 2k)^2 - 4(1)(11 + k) < 0$

$4 - 8k + 4k^2 - 44 - 4k < 0$

$4k^2 - 12k - 40 < 0$ [1]

$k^2 - 3k - 10 < 0$



Continue 4

[1]

$(k-5)(k+2) \leq 0$

$-2 < k < 5$ [1]

5. $f(x) = 11 - 4x - 2x^2$

(*a*) Express f(x) in the form

$$a + b(x + c)^2$$

where a, b and c are integers to be found.

(3)

(*b*) *Give* clearly the coordinates

of the point where the curve crosses the y-axis.

(2)

(*c*) Write down the equation of the line of symmetry of C.

(1)

(Total 6 marks)

a. $-2x^2 - 4x + 11$

$-2(x^2 + 2x + (1)^2 - (1)^2) + 11$

$-2[(x+1)^2 - 1] + 11$

$-2(x+1)^2 + 2 + 11$

$-2(x+1)^2 + 13$

$a = 13$ [1]

$b = -2$ [1]

$c = 1$ [1]

Continue 5

b. y axis $\Rightarrow x = 0$ [1]

$\Rightarrow y = 11 - 4(0) - 2(0)^2 = 11$ [1]

$(0, 11)$

c. $x = \frac{-b}{2a} = \frac{-(-4)}{2(-2)} = \frac{4}{-4} = -1$

$x = -1$ [1] or $-2(x+1)^2 + 13$

↳ $x = -1$

TOTAL FOR PAPER IS 30 MARKS