Mathematical Methods

Polynomial Functions Practice Test

Name _____

SECTION ONE: RESOURCE FREE

TOTAL: 51 marks

EQUIPMENT: pens, pencils, pencil sharpener, highlighter, eraser, ruler, SCSA formula sheet

WORKING TIME: 51 minutes

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Show all of your working clearly. *Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.*

		Percentage
Non calc	/ 21	
Calc	/ 30	
Total	/ 51	

d. A new hospital is being planned for the consortium with between 100 and 400 beds. What number of beds would you recommend and why?

e. The consortium are considering closing two smaller hospitals, with 250 and 310 beds, and replacing them with a single hospital to accommodate all their patients. Discuss whether this would be an effective strategy to increase profitability.

END OF SECTION 2

Question 1   [2,2,4 = 8 Marks]

a. Find the equation of the circle drawn, you do not need to expand or simplify your answer.
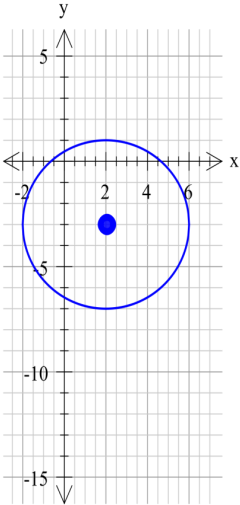
b. Give the domain and the range of this circle.

c. Find the centre and radius of the circle defined by:

$$x^2 + y^2 - 8x + 6y - 24 = 0$$

Question 5   [1,3,1,2,3 = 10 Marks]

A recent study into the annual profitability, $P(B)$, in dollars, of individual hospitals owned by a consortium found that it varied with the number of beds, B, in each hospital.

Using the model:

$$P(B) = 0.2B^3 - 240B^2 + 80000B - 1500000$$

a. What annual profit is expected if a hospital has 50 beds?

b. Graph $P(B)$ on the axes below showing all intercepts, turning points and P(700).
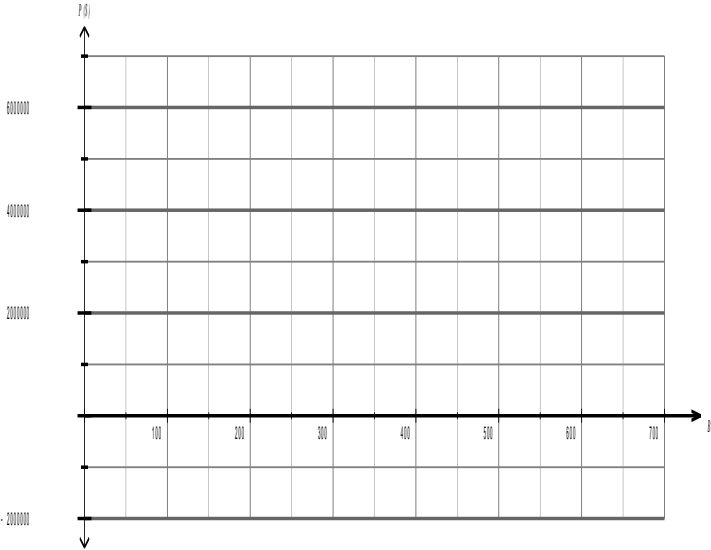
c. What is the fewest number of beds a hospital needs to make a profit rather than a loss?

Question 4   [1,4,1,2 = 8 Marks]

The depth of water in a flask in a science experiment was measured for an eight hour period and followed the rule:

$$d = 0.4t^3 - 5t^2 + 16t + 2$$

Where t was the number of hours since the experiment began and d the depth of water in centimetres.

a. What was the depth of water when the experiment began?

b. In total for how many hours and minutes was the depth 10cm or more during the eight hour period?

c. What was the minimum depth of water during the first eight hours?

d. At what time, correct to nearest minute, was the depth a maximum during the first eight hours?

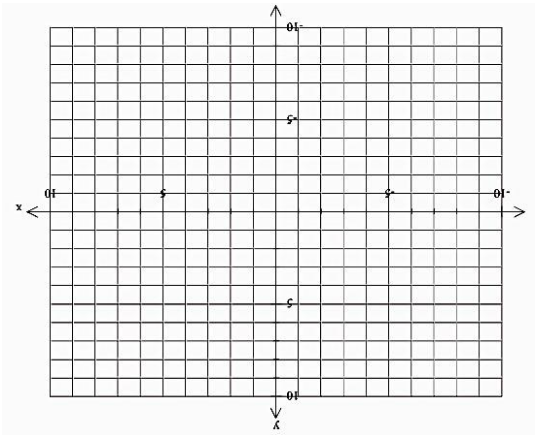# Question 2   [1,1,3,2 = 7 Marks]

For the graph of $y = x^3 - x^2 - 4x + 4$, determine:

a. the coordinates of the point where the curve cuts the y-axis,

b. If $y = f(x)$, what is $f(2)$?

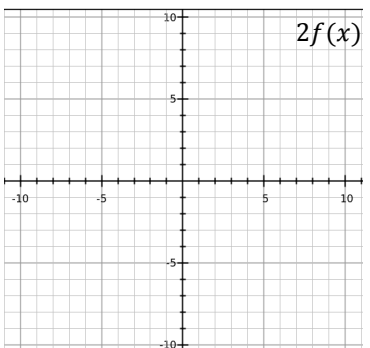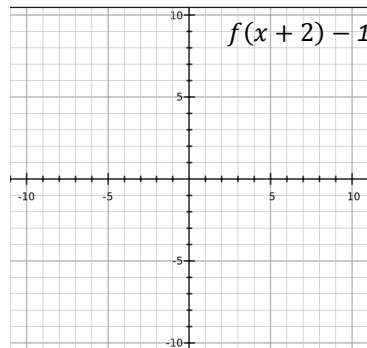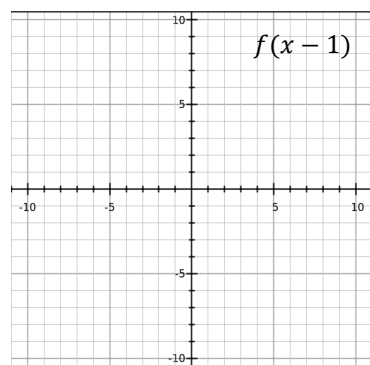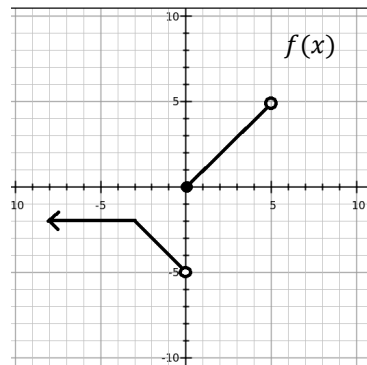c. the coordinates of the points where the line cuts the x-axis
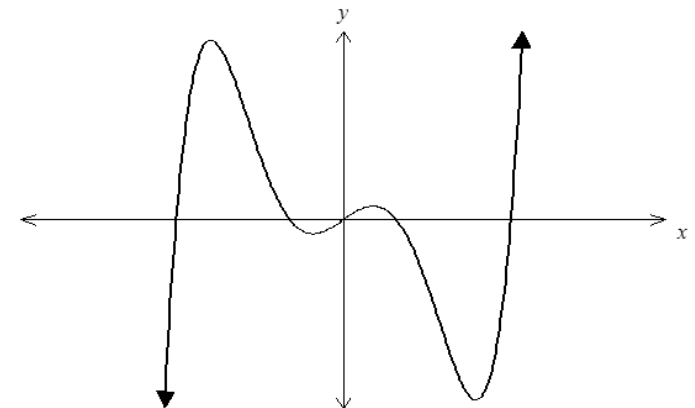
d. Draw a sketch of this graph

Question 3 [2,2,2 = 6 Marks]

The following is the graph of $f(x)$. On the graphs below, sketch the new graph with the transformations applied

$f(x)$

$f(x-1)$

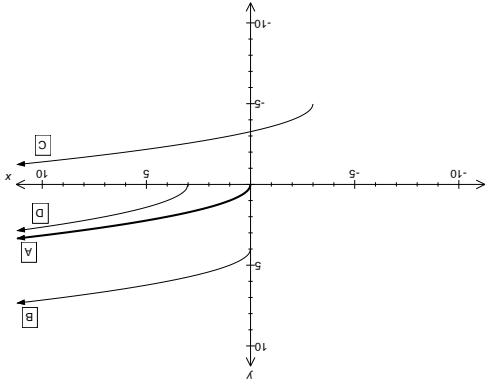$f(x+2)-1$

$2f(x)$

Question 3 [4,2 = 6 Marks]

The graph below is that of the curve $y = x^5 - 6x^3 + 3x$

Use your calculator to help find:

a. Find the co-ordinates of each of the turning points.

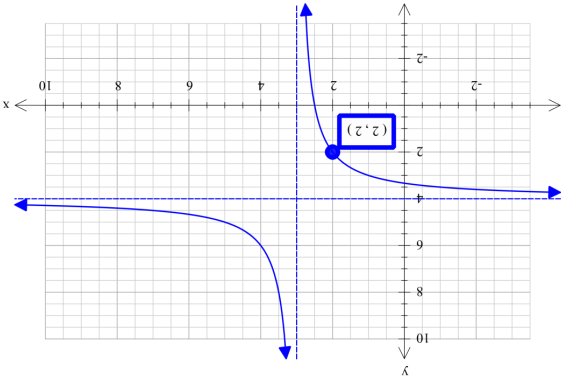b. Find the intervals where the curve is concave downwards.

Question 1 [3 Marks]

Determine the equation of the graph below.

(2 , 2)

Question 2 [3 Marks]

Graph A shown in bold below has equation $y = \sqrt{x}$.

Graphs B, C and D are all translations (no dilations) of graph A.   Write down the equations of B, C and D

Graph B	
Graph C	
Graph D	

Question 4 [3,2 = 5 Marks]

a.   Describe the transformation that takes place when y = x³ is changed to,

$$y = 2(3x - 4)^3 + 5$$

b.   The original graph contains the point (5, 125), where will this point be transformed to in the graph of

$$y = 2(3x - 4)^3 + 5$$

END OF SECTION 1

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<u>**SECTION TWO: RESOURCE ALLOWED**</u>

TOTAL: 30 marks

EQUIPMENT: pens, pencils, pencil sharpener, highlighter, eraser, ruler, SCSA formula sheet, scientific &/ or
                    CAS calculator, 1 A4 page of notes

WORKING TIME: 30 minutes

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Show all of your working clearly. *Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.*