

**Q1.** a) If  $f(x) = 4x - 5$ , evaluate the following: (Chap 6 Pg 152)

- i)  $f(2)$       ii)  $f(-3)$       iii)  $f(0)$       iv)  $f(x) = 23$       v)  $f(x) = -29$

Ans: (i) 3 (ii) -17 (iii) -5 (iv)  $x = 7$  (v)  $x = -6$

b) If  $g(x) = 2x^2 - 3x + 5$ , evaluate the following: i)  $g(3)$       ii)  $g(-2)$       iii)  $g(\frac{1}{2})$

Ans: (i) 14 (ii) 19 (iii) 4

**Q2.** (Chap 6 Pg 158/162/167/171)

a) i) Draw the graph of the function  $f(x) = 3x - 2$  in the domain  $-2 \leq x \leq 3$ .

ii) Use your graph to find  $f(1.5)$ .      Ans: 2.5

b) i) Draw the graph of  $g(x) = 2x^2 - 3x - 7$ , in the domain  $-2 \leq x \leq 3$ .

ii) Use your graph to find  $g(2.5)$ .      Ans: -2

iii) Use your graph to find the minimum value of  $g(x)$ .      Ans: -8.2

c) i) Draw the graph of  $h(x) = 2x^3 + 3x^2 - 11x - 6$ , in the domain  $-3 \leq x \leq 2$ .

ii) Use your graph to find the value of  $f(-1.5)$ .      Ans: 10.4

d) Draw a graph of the function  $f(x) = 3^x$ , in the domain  $-1 \leq x \leq 3$ .

**Q3.** (Chap 6 Pg 162)

i) On the same axes and scales, graph the functions  $f(x) = x^3 - 3x^2 + 2x + 3$  and  $g(x) = 5 + 2x - x^2$ , in the domain  $-1.5 \leq x \leq 3.5$ .

ii) Use your graph to find the value of  $x$  for which  $f(x) = g(x)$ .      Ans: 2.3

**Q4.** (Chap 6 Pg 156/157)

$f(x) = 3x - 2$ ,  $g(x) = x^2$  and  $h(x) = 2 - 4x$  are three functions. Evaluate the following:

- (i)  $f \circ g(1)$       (ii)  $h \circ g(4)$       (iii)  $f \circ h(-2)$       Ans: (i) 1 (ii) -62 (iii) 28

### Past Exam Questions:

#### Q5. 2019 Paper 1 Q3

The function  $f$  is defined as  $f(x) = -x^3 + 4x^2 + x - 2$ , where  $x \in \mathbb{R}$ .

- (a) (i) Complete the table below for the values of  $f$  in the domain  $-1 \leq x \leq 4$  and hence draw the graph of the function  $f(x)$  in the domain  $-1 \leq x \leq 4, x \in \mathbb{R}$ .

$x$	-1	0	1	2	3	4
$f(x)$					10	

Ans:  $x = -0.8, 0.6$

- (ii) Use your graph to estimate the two roots of  $f(x)$  which are in the domain  $-1 \leq x \leq 4$ .

**Q6. 2018 Paper 1 Q8**

The amount, in appropriate units, of a certain medicinal drug in the bloodstream  $t$  hours after it has been taken can be estimated by the function:

$$C(t) = -t^3 + 4.5t^2 + 54t, \text{ where } 0 \leq t \leq 9, t \in \mathbb{R}.$$

- (a) Use the drug amount function,  $C(t)$ , to show that the amount of the drug in the bloodstream 4 hours after the drug has been taken is 224 units.
- (b) Use the function  $C(t)$  to complete the table below.

$t$ (Hours)	0	1	2	3	4	5	6	7	8	9
$C(t)$ (Units)	0	57.5			224					

(c) Draw the graph of the function  $C(t)$  for  $0 \leq t \leq 9$  where  $t \in \mathbb{R}$ .

(d) Use your graph to estimate each of the following values.  
In each case show your work on the graph above.

(i) The amount of the drug in the bloodstream after  $3\frac{1}{2}$  hours.

Ans: 201

(ii) How long after taking the drug will the amount of the drug in the bloodstream be 100 units?

Ans: 1.6 hrs

**Q7. 2017 Paper 1 Q8**

A company makes and sells fibre optic cable. It can sell, at most, 200 kilometres of cable in a week. For a certain range of its production the company has found that profit can be modelled using the function:

$$P(x) = 275x - x^2 - 2000, \text{ where } x \leq 200.$$

In the function,  $x$  is the number of kilometres of fibre optic cable sold and  $P(x)$  is the profit in euro.

(a) Use the profit function,  $P(x)$ , to find how much money the company loses if it does not sell any cable.

Ans: €2000

(c) (i) The table below shows some of the data representing the profit on sales.  
Use the profit function,  $P(x)$ , to complete the table.

Number of km of cable sold ( $x$ )	50	60	70	80	90	100
Profit (€)			12 350			

(ii) Use the data in the table to draw the graph of the profit function on the axes below for  $50 \leq x \leq 100, x \in \mathbb{R}$ .

(iii) Use your graph to estimate the lower and upper range of sales (in km of cable) in order to make a profit of between €10 000 and €14 000 in a particular week.  
Show your work on the graph above.

Ans: between 53 and 82km roughly

**Q8. 2016 Paper 1 Q4**

The function  $f: x \mapsto x^3 + x^2 - 2x + 7$  is defined for  $x \in \mathbb{R}$ .

- (a) Find the coordinates of the point at which the graph of  $f$  cuts the  $y$ -axis.     **Ans: (0, 7)**
- (b) Verify, using algebra, that the point  $A(1, 7)$  is on the graph of  $f$ .

**Q9. 2015 Paper 1 Q5**

The diagram shows the graph of the function  $f(x) = 5x - x^2$  in the domain  $0 \leq x \leq 5, x \in \mathbb{R}$ .

- (a) The function  $g$  is  $g(x) = x + 3, x \in \mathbb{R}$ .  
The points  $A(1, k)$  and  $B$  are the points of intersection of  $f$  and  $g$ .  
Find the co-ordinates of  $A$  and of  $B$ .

**Ans: A = (1, 4) B = (3, 6)**

