1. A line joins the points A(2, 1) and B(4, 5).

(a) Find the gradient of the line AB.

(2)

Let M be the midpoint of the line segment AB.

(b) Write down the coordinates of M.

(1)

(c) Find the equation of the line perpendicular to AB and passing through M.

(3)

(Total 6 marks)

2. You may choose from three courses on a lunchtime menu at a restaurant.

s: you choose a salad,
m: you choose a meat dish (main course),
d: you choose a dessert.

You choose a **two** course meal which **must** include a main course and either a salad or a dessert, but not both.

(a) Write the sentence above using logic symbols.

(2)

(b) Write in words $s \Rightarrow \neg d$.

(2)

(c) Complete the following truth table.

(2)

s	d	$\neg s$	$\neg s \Rightarrow d$
T	T		
T	F		
F	T		
F	F		

(Total 6 marks)

3. The table below shows the frequency distribution of the number of dental fillings for a group of 25 children.

Number of fillings	0	1	2	3	4	5
Frequency	4	3	8	q	4	1

(a) Find the value of q.

(2)

(b) Use your graphic display calculator to find

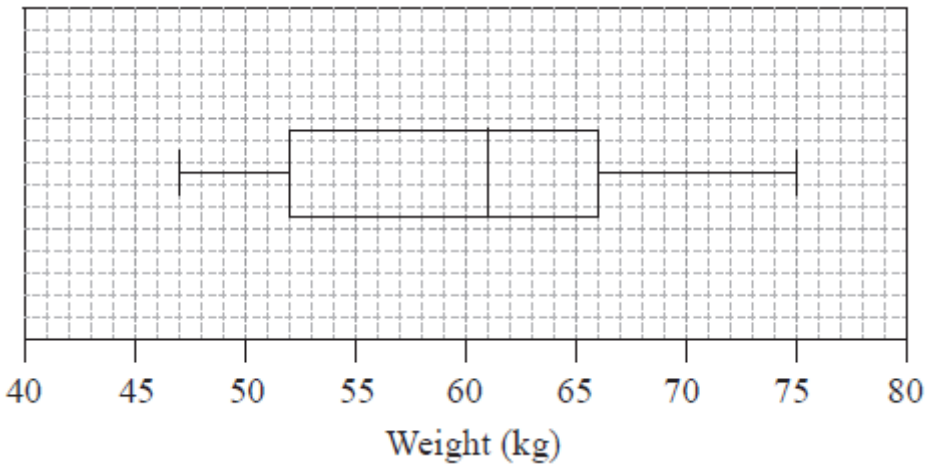
(i) the mean number of fillings;

(ii) the median number of fillings;

(iii) the standard deviation of the number of fillings.

(4)
(Total 6 marks)

4. The weights in kg, of 80 adult males, were collected and are summarized in the box and whisker plot shown below.



(a) Write down the median weight of the males.

(1)

(b) Calculate the interquartile range.

(2)

(c) Estimate the number of males who weigh between 61 kg and 66 kg.

(1)

(d) Estimate the mean weight of the lightest 40 males.

(2)
(Total 6 marks)

5. The number of cells, C, in a culture is given by the equation $C = p \times 2^{0.5t} + q$, where t is the time in hours measured from 12:00 on Monday and p and q are constants.

The number of cells in the culture at 12:00 on Monday is 47.
The number of cells in the culture at 16:00 on Monday is 53.

Use the above information to

(a) write down two equations in p and q;

(2)

(b) calculate the value of p and of q;

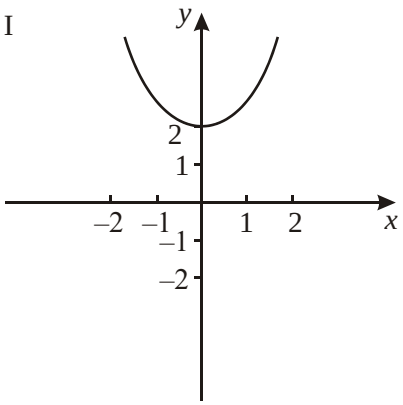
(2)

(c) find the number of cells in the culture at 22:00 on Monday.

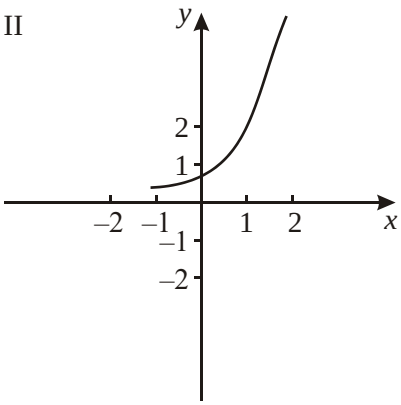
(2)
(Total 6 marks)

6. The following diagrams show the graphs of five functions.

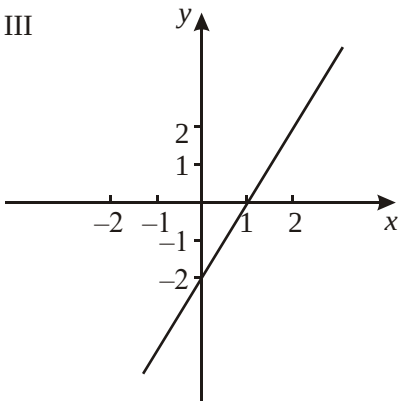
I



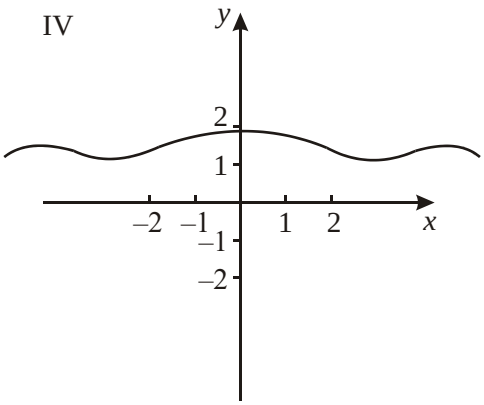
II



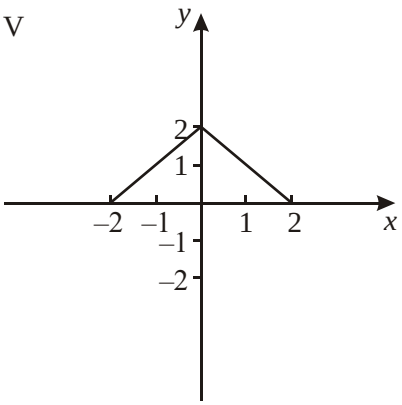
III



IV



V



Each of the following sets represents the range of one of the functions of the graphs.

(a) $\{y \mid y \in \mathbb{R}\}$

(b) $\{y \mid y \geq 2\}$

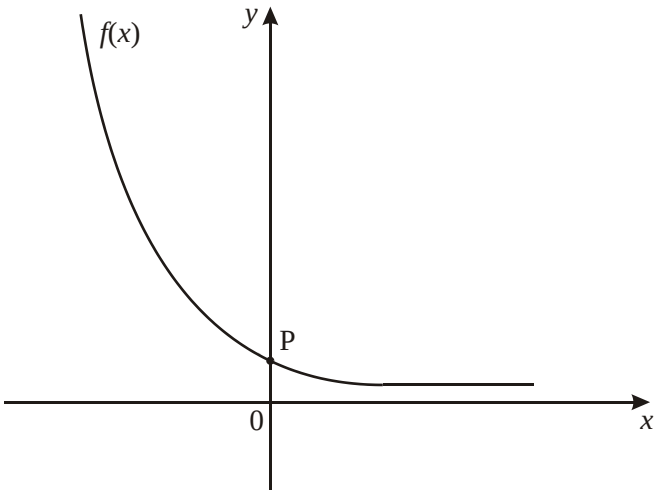
(c) $\{y \mid y > 0\}$

(d) $\{y \mid 1 \leq y \leq 2\}$

Write down which diagram is linked to each set.

(Total 4 marks)

7. The following diagram shows part of the graph of an exponential function $f(x) = a^{-x}$, where $x \in \mathbb{R}$.



(a) What is the range of f?

(b) Write down the coordinates of the point P.

(c) What happens to the values of $f(x)$ as elements in its domain increase in value?

(Total 4 marks)