AQA Level 2 Further mathematics Number & algebra

Section 3: Functions and their graphs

Exercise

1. For each of the functions below, sketch the graph of $y = f(x)$, and state the range of the function.
   (i) $f(x) = 1 - 3x$ where $x > 0$
   (ii) $f(x) = x^2$ where x can take any value

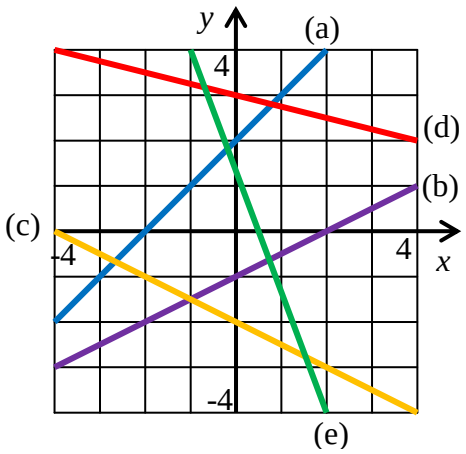
2. Sketch the graphs of the following functions:
   (i) $f(x) = x^2 + 6x + 8$
   (ii) $f(x) = 4 - x^2$

3. A function is defined as $f(x) = \dfrac{1}{1+x^2}$ where $-1 \le x \le 1$
   (i) Find f(-1) and f($\frac{1}{2}$).
   (ii) State the range of the function.

4. The function is defined as:
   $$f(x) = \frac{1}{x-1}.$$
   (i) What value of x must be excluded from the domain of this function?
   (ii) Find (a) f(2) (b) f(– 3) (c) f(0)
   For what value of x is $f(x) = 2$?

5. Sketch the following lines.
   (i) $y = x + 3$ (ii) $y = 2x - 1$ (iii) $x + y = 5$
   (iv) $4y = x + 12$ (v) $3y + x + 6 = 0$ (vi) $5y = 15 - 2x$

6. Find the equations of the lines (a)-(e) in the diagram below.



7. Find the equations of the following lines.
   (i) With gradient 4 and passing through (2, 3)
   (ii) With gradient $-\frac{1}{3}$ and passing through (4, -1)
   (iii) With gradient $-\frac{1}{5}$ and passing through (-1, -6)

AQA FM Number and algebra 3 Exercise

8. Find the equation of the line AB in each of the following cases.
   (i) A(1, 6), B(3, 2) (ii) A(8, -1), B(-2, 3)
   (iii) A(-5, 2), B(7, -4) (iv) A(-3, -5), B(5, 1)

9. The sides of a triangle are formed by parts of the lines $y+3x=11$, $3y=x+3$ and $7y+x=37$. Find the coordinates of the vertices of the triangle.

10. A function is defined as

$$\begin{aligned} f(x) &= 2x \quad && 0 \le x < 2 \\ &= 4 && 2 \le x < 3 \\ &= 7-x && 3 \le x \le 7 \end{aligned}$$

    Sketch the graph of $y = f(x)$.

11. A function is defined as $f(x) = 3x^2 - x$.

    Find an expression for $\dfrac{f(x+h)-f(x)}{h}$.

12. The domain of $f(x)$. The range of $f(x)$ is $f(x) \ge 2$.

    Find a possible formula for $f(x)$.