Functions

i. For each of the given functions, calculate the following values:

- $f(2)$ if $f(x) = x + 5$
- $f(5)$ if $f(x) = 3 - x$
- $g(9)$ if $g(x) = \frac{1}{x} + 3$
- $f(2)$ if $f(x) = 2\sqrt{x}$
- $f(-4)$ if $f(x) = x^2 - x + 4$
- $f(-10)$ if $f(x) = 2x^2 - 5x - 6$
- $h(-7)$ if $h(x) = \frac{8}{x^2}$
- $g(0)$ if $g(x) = 1$
- $f(90)$ if $f(x) = \sin x$
- $f(\sqrt{2})$ if $f(x) = 3x^2 + 5x - 9$

ii. Express the following quadratic functions in the form $(x+p)^2 - q$ and then find the minimum point on the curve.

- $f(x) = x^2 + 20x$
- $g(x) = x^2 + 2x - 3$
- $f(x) = x^2 - 16x + 2$
- $f(x) = x^2 + 2x - 11$
- $h(x) = x^2 - 8x + 1$
- $a(x) = 2x^2 + 12x - 3$

iii. Find the coordinates of the maximum point on the curve $y = 4 - 6x - x^2$.

iv. A curve C has equation $y = x^3 + 4x^2 + 3x$

- The equation of the curve C can be given in the form $y = x(ax^2 + bx + c)$, where a, b, c are constants. State the values of a, b, c
- Hence, or otherwise, factorise the equation of C completely.

v. The curve C has equation $y = (x-1)(x+2)^2$

- State the co-ordinates of points where the curve meets the x-axis.
- Show that the point $(2, 16)$ lies on the curve C.
- The equation of the curve C can be given in the form $y = ax^3 + bx^2 + cx + d$. Find the values of the coefficients a, b, c, d