Higher Homework 02

1) Find the equation of the line that is perpendicular to the line $y = \frac{1}{3}x + 5$ and passes through the point (-4,7).

2) Find the equation of the line that is perpendicular to the line $y = 17$ and passes through the point (3,8).

3) Two functions f and g are defined on the set of real numbers by $f(x) = x - 1$ and $g(x) = x^2$.

a) Find formulae for i) $f(g(x))$ ii) $g(f(x))$

b) The function $h(x)$ is defined as $f(g(x)) + g(f(x))$.
Show that $h(x) = 2x^2 - 2x$ and sketch the graph of this function.

4) The function f, defined on a suitable domain, is given by $f(x) = \frac{3}{x+1}$

a) Find an expression for $h(x) = f(f(x))$, giving your answer as a fraction in its simplest form.

b) Describe any restriction on the domain of h.

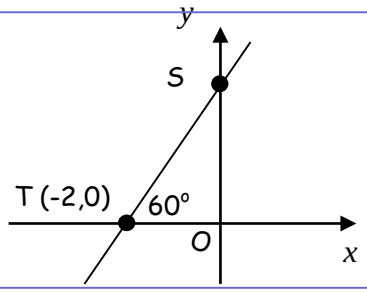
5) The vertices of a triangle are A (1,4), B (-1,-6) and C (7,-2).

a) Find the equation of the altitude from point A.

b) Find the equation of the perpendicular bisector of the line AC.

c) Find the point of intersection of these two lines.

6) Find the equation of the line ST, where T is the point (-2,0) and angle STO is 60°.



7) The functions f and g are defined on a suitable domain such that

$f(x) = 3x - 4$ and $g(x) = x^3 + 7$

a) Find expressions for the inverse functions $f^{-1}(x)$ and $g^{-1}(x)$.

b) State the domain and range of the function $g(x)$.

8) The point A has coordinates (7,4). The straight lines with equations $x + 3y + 1 = 0$ and $2x + 5y = 0$ intersect at B.

a) Find the gradient of AB.

b) Hence show that AB is perpendicular to only one of these two lines.