ALGEBRA (Q 2 & 3, PAPER 1)

2010

2. (a) Find the values of x which satisfy
$$2(3+4x) \leq 22, \text{ where } x \in \mathbf{N}.$$

(b) Solve for x and y
$$2x - y = 1$$
$$x^2 - xy = -6.$$

(c) (i) Show, by division, that $3x + 1$ is a factor of $3x^3 + 4x^2 - 89x - 30$.

(ii) Hence, or otherwise, solve the equation $3x^3 + 4x^2 - 89x - 30 = 0$.

3. (a) Given that $3(b + a) = t(6 - a)$,
calculate the value of a when $t = 3$ and $b = -4$.

(b) Solve for x
$$5(x+1)^2 = 2(x+1) + 5.$$
Give your answer correct to two decimal places.

(c) (i) $2 + \sqrt{3}$ is a root of the equation $x^2 - 4x + c = 0$, where c is a real number.
Find the value of c and write down the other root.

(ii) The equation $x^2 + 10x + k = 0$ has equal roots.
Find the value of the real number k and write down the value of each root.

ANSWERS
2. (a) $x = \{1, 2\}$
   (b) $x = 3, -2; y = 5, -5$
   (c) (ii) $x = -6, -\frac{1}{3}, 5$

3. (a) $a = 5$
   (b) $x = -1.82, 0.22$
   (c) (i) $c = 1; 2 - \sqrt{3}$ (ii) $k = 25; x = -5$