# TY Hons Maths - Problem Set No.7

**Name of Student: _____ For _____**

**1.**

1. Evaluate $\dfrac{2+\sqrt{5}}{2-\sqrt{5}}$

2. Prove that $-k$ is a root of the function
$f(x) = x^3 + (1-k^2)x + k,$ where $k$ is a constant.

3. Find the real numbers $a$ and $b$ such that
$$x^2 - 2x - 6 = (x+a)^2 + b$$

4. Simplify $\dfrac{x^3 + 8}{x+2} \div \dfrac{x^2 + 2x + 4}{2x + 4}$

5. Given that the quadratic equation $x^2 + 2tx - 2x + 2t + 1 = 0$ has equal roots,

(i) find the value of $t$ where $t > 0$.
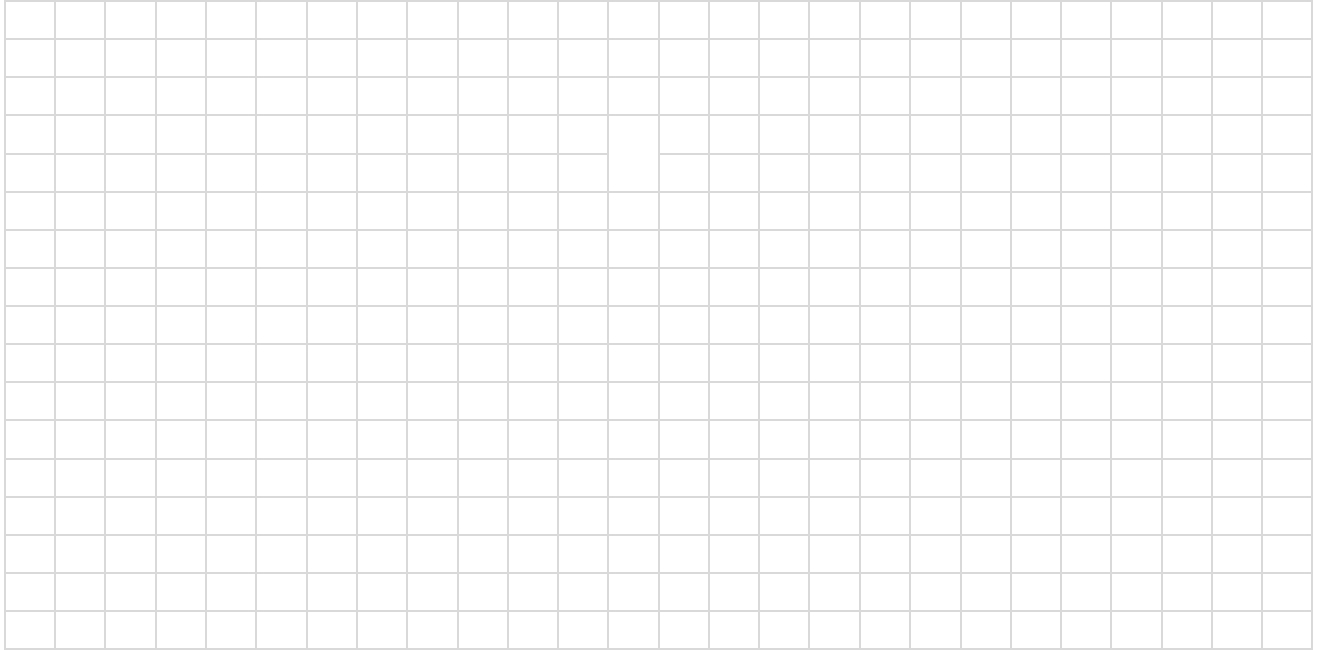
(ii) use this value of $t$ to evalute the roots.

**6.** Solve the following systems of simultaneous equations: $\begin{cases} 2x^2 - y^2 = 14 \\ x - y = 1 \end{cases}$

7. Write down the cubic equation which has roots of $-1$, $-2$ and 3 and which contains the point $(0, -12)$.

**5.** The function $f(x) = 2x^2 + 8x - 4$ can be expressed as $a(x+b)^2 + c$, where $a, b, c \in Z$

    (i)  Find the values of $a, b$ and $c$.

    (ii)  Hence, find the co-ordinates of the local minimum of the curve.

    (iii) Solve the equation $f(x) = 0$, writing your answers in surd form.

    (iv) Where does the graph cut the y-axis?

    (v) Draw a rough sketch of $f(x)$ on the graph paper given.