

TY Hons Maths - Problem Set 2

1. Simplify the following

(i) $\frac{x^2 - xy}{x^2 - y^2}$

(ii) $\frac{x^2 - 2xy + y^2}{x^2 - y^2} \times \frac{3x + 3y}{4x - 4y}$

(iii) $\frac{1}{x^2 - 4} - \frac{x}{x + 2}$

2. Factorise fully each of the following

(i) $3x^2 - 11x + 6$

(ii) $x^2y - y^3 + x^3 - xy^2$

(iii) $8x^3 - 64y^3$

3. Given that $x = \sqrt{a+1}$ and $y = \sqrt{a-1}$, evaluate $x^2 - y^2$.

4. Use factorisation to solve the following equations:

(i) $x^2 + x - 12 = 0$

(ii) $8x^2 - 10x - 3 = 0$

(iii) $x^2 - 3x = 0$

5. Find the discriminant of the following equations and hence state the *nature* of their roots. (*Nature* means whether they are real, not real etc)

(i) $x^2 + 8x + 16 = 0$

(ii) $x^2 + 3x + 7 = 0$

(iii) $x^2 + 5x + 2 = 0$

6. Find the value of k if $2\sqrt{28} + 5\sqrt{63} - \sqrt{175} = k\sqrt{7}$

7. 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 evaluate the roots.

8. Find the real numbers a and b such that

$$4x^2 + 8x + 12 = a(x + b)^2 + c$$