

Mathematics Department – Langholm Academy

HIGHER HOMEWORK

UNIT 2

CHAPTER 1.2

Quadratic Theory

Higher - Unit 2
Quadratic Theory

1. Find the nature of the roots of the following (real and distinct, real and equal, or no real roots).
 - a. $x^2 + 6x + 4 = 0$
 - b. $3x^2 + 2x + 1 = 0$
 - c. $x^2 - 4x + 4 = 0$
 - d. $4x^2 - 3x = 2$
2. Find k so that each of the following has equal roots,
 - a. $x^2 - 8x + k = 0$
 - b. $x^2 + kx + 16 = 0$
3. Find k given that $x^2 + (k + 1)x + 9 = 0$ has equal roots, $k \neq 0$.
4. Find the range of values of k such that the equation $kx^2 - x - 1 = 0$ has no real roots.
5. Find the values of k such that $kx^2 + kx + 6 = 0$ has equal roots ($k \neq 0$).
6. Show that $x = -1$ is a solution of $x^3 + kx^2 + kx + 1 = 0$, and hence find the range of values of k for which all the roots of $x^3 + kx^2 + kx + 1 = 0$ are real.
7. Show that $y = 2x - 1$ is a tangent to $y = x^2$
8. Show that the line $y = 3x + k$ meets the parabola $y = x^2 + 4$ where $x^2 - 3x + (4 - k) = 0$. Find the value of k that makes the line tangent to the parabola, and find the coordinates of the point of contact.
9. Solve the following quadratic inequalities (illustrate your answer with a sketch)
 - a. $4x^2 + 5x + 1 \leq 0$
 - b. $x^2 - 10x + 25 \neq 0$