

New Higher Homework 7

Section 1: Polynomials and Quadratics

1. Show that the following polynomial has the given factor, and hence factorise it fully:
 $2x^3 - 11x^2 + 17x - 6$; factor $x - 3$
2. Find p , given that $(x + 3)$ is a factor of $x^3 - x^2 + px + 15$.
3. Solve the quadratic inequation: $2x^2 + 5x - 3 \leq 0$
4. Show that the roots of the equation $(k - 2)x^2 - (3k - 2)x + 2k = 0$ are real for all $k \in R$.
5. (a) Prove that the line with equation $y + 2x = 4$ is tangent to the parabola $y = x^2 - 4x + 5$.
(b) Find the coordinates of the point of contact.

Section 2: Circles

1. Write down the equation of each of these circles:
(a) Centre $(0,0)$; radius 3. (b) Centre $(2,1)$; radius $\sqrt{2}$.
2. Write down the centre and radius of each of these circles:
(a) $x^2 + (y - 3)^2 = 10$ (b) $x^2 + y^2 + 10x + 12y - 3 = 0$
3. A is the point $(2,1)$ and B is the point $(8,9)$.
(a) Find the equation of the circle with centre A and radius AB.
(b) Find the equation of the circle that has AB as a diameter.
4. A circle centred at the origin has the line $x + y = 4$ as a tangent.
Find the equation of the circle. (Hint: Sketch it!)
5. Find the equation of the tangent to the circle $x^2 + y^2 - 6x + 2y + 2 = 0$ which passes through the point $A(1,-3)$ on the circumference of the circle.