

Test: Algebra: Equations and inequalities [50 marks]

Question 1

1. Solve for x in each of the following;

1.1. $7 - 5x = x^2$ (5)

1.2 $1 + \frac{x+1}{x-2} + \frac{2}{x-1} = 0$ (6)

1.3 $x^2 - 6 < -5x$ (5)

1.4 $-x(x - 9) \leq 14$ (5)

[21]

Question 2

2.1 Solve for both x and y in the system of equations below.

$xy + 6 = 0$ and $x + 3y + 3 = 0$ (6)

2.2 Consider the equation $x^2 + 5xy + 6y^2 = 0$

2.2.1 calculate the values of the ratio $\frac{x}{y}$ (3)

2.2.2 hence calculate the values of x and y if $x + y = 8$ (4)

[13]

Question 3

3.1 Determine the nature of the roots of:

3.1.1 $2x^2 + 3x - 4 = 0$ (2)

3.1.2 $4x^2 - 12x + 9 = 0$ (2)

3.2 For which values of p are the roots of $x(2x + p) = -3$ non real (3)

3.3 For which values of k will the roots of $\frac{4x-3}{(x-1)^2} = k$ be real (3)

3.4 Show that the roots of $x^2 - 2(p - 1)x - 4p = 0$ are rational for all rational values of p. (3)

3.5 Show that the roots of $ax(x + 1) + 2x(x - 1) = x + 5$ are real for all real values of a. (3)

[16]