O Level A Maths Tutorial 2: Equations and Inequalities

Syllabus :

- Conditions for a quadratic equation to have:
  (i) two real roots
  (ii) two equal roots
  (iii) no real roots and related conditions for a given line to:

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1. Using the discriminant, determine the nature of roots for each of the following:

(i) $x^2 - 4x + 4 = 0$

(ii) $x^2 - 4x + 5 = 0$

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

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and related conditions for a given line to:
(i) intersect a given curve
(ii) be a tangent to a given curve
(iii) not intersect a given curve

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2. Determine the nature of intersection between the curve and line in each of the following, State whether they intersect at 2 points, just touch, or miss each other.

(i) curve: $y = x^2 - 3x + 5$
line: $y = x + 1$

(ii) curve: $y = x^2 - 3x + 5$
line: $y = x$

(iii) curve: $y = x^2 - 3x + 5$
line: $y = x + 2$

• Solving simultaneous equations in two variables by substitution, with one of the equations being a linear equation

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3. Solve the following simultaneous equations for x and y:

$$y = x^2 - 3x + 5$$

$$y = x + 2$$

• Solving quadratic inequalities, and representing the solution on the number line

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4. Find the range of x that satisfies this inequality:

$$(x + 2)(x - 1) > 0.$$

Also show your answer on a number line.