<u>Points of Intersection</u>

If $y = f(x)$ and $y = g(x)$, then the x values of the points of intersection can be found when $f(x) = g(x)$.

Examples:

1. On the same diagram sketch the curves with equations $y = x(x - 3)$ and $y = x^2(1 - x)$. Find the coordinates of their points of intersection.

2. On the same diagram sketch the curves with equations $y = x^2(3x - a)$ and $y = \frac{b}{x}$, where a, b are positive constants. State, giving a reason, the number of real solutions to the equation $x^2(3x - a) - \frac{b}{x} = 0$

Test Your Understanding

On the same diagram sketch the curves with equations $y = x(x - 4)$ and $y = x(x - 2)^2$, and hence find the coordinates of any points of intersection.

Extension

1. [MAT 2005 1B]

The equation $(x^2 + 1)^{10} = 2x - x^2 - 2$

    A) has $x = 2$ as a solution;

    B) has no real solutions;

    C) has an odd number of real solutions;

    D) has twenty real solutions.

2. [MAT 2010 1A] The values of k for which the line $y = kx$ intersects the parabola $y = (x - 1)^2$ are precisely

    A) $k \le 0$ B) $k \ge -4$

    C) $k \ge 0$ or $k \le -4$ D) $-4 \le k \le 0$

3. [MAT 2013 1D]

Which of the following sketches is a graph of $x^4 - y^2 = 2y + 1$?

(a)   (b)

(c)   (d)