Name: _____ 5-a-day Further Maths

28th February

Corbettmaths

Solve the simultaneous equations

$$y = x^2 - 9x - 3$$

$$y = x$$

$x^2 - 9x - 3 = x$

$x^2 - 10x - 3 = 0$

$(x - 5)^2 - 25 - 3 = 0$

$(x - 5)^2 - 28 = 0$

$(x-5)^2 = 28$

$x - 5 = \pm\sqrt{28}$

$x = 5 \pm \sqrt{28}$

$x = 5 + \sqrt{28}$, $y = 5 + \sqrt{28}$

or

$x = 5 - \sqrt{28}$, $y = 5 - \sqrt{28}$

Show that $2 - 2sin^2x$ is equivalent to $2cos^2x$

$2 - 2(1 - \cos^2 x)$

$2 - 2 + 2\cos^2 x$

$= 2\cos^2 x$ QED

The volume of a container with a height of x, is given by

$V = x(x - 2)(5 - x)$ where $2 < x < 5$

$V = x(5x - x^2 - 10 + 2x)$

$V = x(-x^2 + 7x - 10)$

$V = -x^3 + 7x^2 - 10x$

Find $\frac{dV}{dx}$

$\frac{dV}{dx} = -3x^2 + 14x - 10$

At maximum, $\frac{dV}{dx} = 0$

$0 = -3x^2 + 14x - 10$

$0 = 3x^2 - 14x + 10$

$a = 3$, $b = -14$, $c = 10$

Hence find the value of x for which the volume is a maximum. Give your answer to 1 decimal place.

$x = \frac{14 \pm \sqrt{196 - 120}}{6}$

$x = 3.79$ ✓ or $x = 0.88$ ✗

$x = 3.8$