Name: _____ 5-a-day Further Maths

25th April

Corbettmaths

$f(x) = 5 - 2x$ for $-4 \leq x \leq 3$

Work out the range of $f(x)$

$f(-4) = 5 + 8 = 13$

$f(3) = 5 - 6 = -1$

$-1 \leq f(x) \leq 13$

The transformation matrix $\begin{pmatrix} b & -2 \\ -1 & 3 \end{pmatrix}$ maps the point $(4, 1)$ onto the point $(34, c)$

Find b and c $b = 9$ $c = -1$

$\begin{pmatrix} b & -2 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} 4 \\ 1 \end{pmatrix} = \begin{pmatrix} 34 \\ c \end{pmatrix}$

$4b - 2 = 34$ $\quad -4 + 3 = c$

$4b = 36$ $\quad c = -1$

$b = 9$

Prove $-(2x+1)^2 - x(x-6)$ is negative for all values of x

$-(4x^2 + 4x + 1) - x^2 + 6x$

$-4x^2 - 4x - 1 - x^2 + 6x$

$= -5x^2 + 2x - 1$

$-5\left(x^2 + \frac{2}{5}x\right) - 1$

$-5\left[\left(x + \frac{1}{5}\right)^2 - \frac{1}{25}\right] - 1$

$-5\left(x + \frac{1}{5}\right)^2 + \frac{1}{5} - 1$

$-5\left(x + \frac{1}{5}\right)^2 - \frac{4}{5}$

As $\left(x + \frac{1}{5}\right)^2 \geq 0$

$-5\left(x + \frac{1}{5}\right)^2 \leq 0$

$\therefore$

$-5\left(x + \frac{1}{5}\right)^2 - \frac{4}{5} < 0$

QED

Solve

$3\cos^2 x - 2\sin^2 x = 1$

for $0° < x < 360°$

$3\cos^2 x - 2(1 - \cos^2 x) = 1$

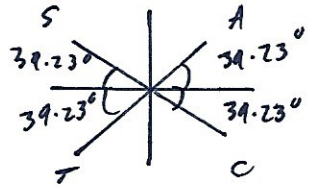
$3\cos^2 x - 2 + 2\cos^2 x = 1$

$5\cos^2 x = 3$

$\cos^2 x = \frac{3}{5}$

$\cos x = \pm\sqrt{\frac{3}{5}}$

$\cos^{-1}\sqrt{\frac{3}{5}} = 39.23°$



$x = 39.23°, 140.77°, 219.23°, 320.77°$