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1. (a) Express $7\cos x - 24\sin x$ in the form $R\cos(x+\alpha)$ where $R > 0$ and $0 < \alpha < \frac{\pi}{2}$. Give the value of α to 3 decimal places.

(3)

(b) Hence write down the minimum value of $7\cos x - 24\sin x$.

(1)

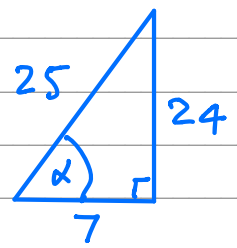
(c) Solve, for $0 \leqslant x < 2\pi$, the equation

$$7\cos x - 24\sin x = 10$$

giving your answers to 2 decimal places.

(5)

a)



$7\cos x - 24\sin x$

$= 25\left(\frac{7}{25}\cos x - \frac{24}{25}\sin x\right)$

$= 25\cos(x + 1.287)$

$\alpha = \tan^{-1}\left(\frac{24}{7}\right)$

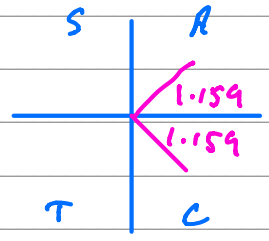
$= 1.287$

b) Minimum Value $= -25$

c) $25\cos(x + 1.287) = 10$

$\cos(x + 1.287) = \frac{10}{25}$

$x + 1.287 = \cos^{-1}\left(\frac{10}{25}\right)$



$\cos^{-1}\left(\frac{10}{25}\right) = 1.159$

$x + 1.287 = 1.159, \quad 5.124$

$x = -0.128 \quad 3.837$

$+2\pi$

$= 6.155$

$x = 6.16, \quad 3.84$

H 3 5 4 0 4 R A 0 2 2 8