QUESTION PART REFERENCE

2(a) Express $2\cos x - 5\sin x$ in the form $R\cos(x+\alpha)$, where $R>0$, $0<\alpha<\pi/2$, giving your value of α to 3s.f.

$$2\cos x - 5\sin x = R\cos x\cos\alpha - R\sin x\sin\alpha$$

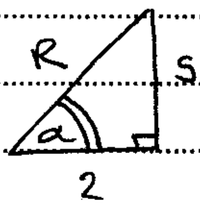
$\therefore R\sin\alpha = 5$

$R\cos\alpha = 2$

$\frac{\sin\alpha}{\cos\alpha} = \cancel{\tan\alpha}$

$\therefore \tan\alpha = \frac{5}{2}$

$\tan^{-1}\left(\frac{5}{2}\right) = \alpha = 1.19^c$



$R = \sqrt{2^2+5^2} = \underline{\underline{\sqrt{29}}}$

$\therefore \underline{\underline{2\cos x - 5\sin x = \sqrt{29}\cos(x+1.19^c)}}$

(b)(i) Find the value of x where $2\cos x - 5\sin x$ is a maximum in the value $0<x<2\pi$

Maximum at $\sqrt{29}\cos(x+1.19^c) = \sqrt{29}$

$\therefore \cos(x+1.19^c) = 1$

$\cos^{-1}(1) = x+1.19^c = 0, 2\pi$

$\therefore x = -1.19^c, 5.09^c$

$\therefore \underline{\underline{x = 5.09^c}}$ (within range $0<x<2\pi$)

Do not write outside the box

QUESTION PART REFERENCE	
2.(b).	(ii) Solve the equation $2\cos x - 5\sin x + 1 = 0$ in the interval $0 < x < 2\pi$, giving your solutions to 3s.f.
	$\therefore \sqrt{29}\cos(x + 1.19) = -1$
	$\therefore \cos(x+1.19) = \frac{-1}{\sqrt{29}}$
	$\cos^{-1}\left(\frac{-1}{\sqrt{29}}\right) = x + 1.19 = 1.7576\ldots, 2\pi - 1.7576\ldots$
	$\therefore x = 0.568^c, 3.34^c$