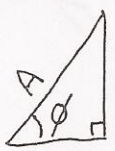
Example: Write $4\sin 3t + 2\cos 3t$ in terms of a cosine function.




$A = \sqrt{(2)^2+(4)^2}$

$A = 2\sqrt{5}$

$\tan\phi = \frac{4}{2} = 2$

$\phi = \tan^{-1}(2) \approx 1.12$

↑ Radian mode!

$4\sin 3t + 2\cos 3t \approx \boxed{2\sqrt{5}\cos(3t - 1.12)}$

$\approx 2\sqrt{5}\cos[3(t-0.37)]$

7) Rewrite your function from part 1) in terms of a cosine function: $A\cos(\omega t - \phi)$. Show your work.

$2\sin(2t) + 3\cos(2t)$

$C_1 = A\sin\phi \Rightarrow \sin\phi = \frac{C_1}{A}$

$C_2 = A\cos\phi \Rightarrow \cos\phi = \frac{C_2}{A}$

$\tan\phi = \frac{C_1}{C_2}$

$\Rightarrow A = \sqrt{C_1^2 + C_2^2}$

$\Rightarrow A = \sqrt{2^2+3^2}$

$A = \sqrt{13}$ /

$\tan\theta = \frac{2}{3} \Rightarrow \theta = \tan^{-1}\left(\frac{2}{3}\right)$

$\boxed{\theta = 0,59}$ /

$\Rightarrow \boxed{\sqrt{13}\cos(2t - 0,59)}$

$= \sqrt{13}\cos(2(t - \quad))$ ?

8) Compare your function from part 4) and part 7). What do you observe? Write a one or two sentence explanation.