

1.) $8\sin t - 6\cos t$

$$A = \sqrt{a_1^2 + a_2^2}$$

$$A = \sqrt{8^2 + (-6)^2}$$

$$A = \sqrt{100}$$

$$A = 10$$

$$\phi = \tan^{-1}\left(\frac{a_2}{a_1}\right) \quad \cos\phi = \frac{a_1}{A}$$

$$= \tan^{-1}\left(\frac{-6}{8}\right) = \frac{8}{10} = \frac{4}{5}$$

$$= \tan^{-1}\left(-\frac{3}{4}\right) \quad \sin\phi = \frac{a_2}{A}$$

$$\phi = -.644 \quad *Q4 \leftarrow \frac{-6}{10} = -\frac{3}{5}$$

$$a_1 \sin(Bt) + a_2 \cos(Bt) = A \sin(Bt + \phi)$$

$$= \boxed{10 \sin(t - .644)}$$

3.) $-\sin t + \cos t$ $\cos\phi = \frac{-1}{\sqrt{2}}$

$$A = \sqrt{(-1)^2 + 1^2} \quad \sin\phi = \frac{1}{\sqrt{2}}$$

$$= \sqrt{2} \quad *Q2$$

$$\phi = \tan^{-1}\left(\frac{1}{-1}\right)$$

$$\phi = \tan^{-1}(-1) = \frac{3\pi}{4}$$

$$= \boxed{\sqrt{2} \sin\left(t + \frac{3\pi}{4}\right)}$$

5.) $\sin 75^\circ = \sin(30^\circ + 45^\circ)$

$$= \sin 30^\circ \cos 45^\circ + \cos 30^\circ \sin 45^\circ$$

$$= \frac{1}{2} \cdot \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2}$$

$$= \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4} = \boxed{\frac{\sqrt{2} + \sqrt{6}}{4}}$$

$$\cos 75^\circ = \cos(30^\circ + 45^\circ)$$

$$\cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$$

$$\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$$

$$\frac{\sqrt{6} - \sqrt{2}}{4} = \boxed{\frac{\sqrt{6} - \sqrt{2}}{4}}$$

6.) $\cos 165^\circ - \cos 75^\circ$

$$= -2 \sin\left(\frac{165+75}{2}\right) \sin\left(\frac{165-75}{2}\right)$$

$$= -2 \sin 120^\circ \sin 45^\circ$$

$$= -2 \cdot \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2}$$

$$= \boxed{-\frac{\sqrt{6}}{2}}$$

7.) $\cos 75^\circ + \cos 15^\circ$

$$= 2 \cos\left(\frac{75+15}{2}\right) \cos\left(\frac{75-15}{2}\right)$$

$$= 2 \cos 45^\circ \cos 30^\circ$$

$$= 2 \cdot \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2}$$

$$= \boxed{\frac{\sqrt{6}}{2}}$$

8.) $\sin 345^\circ = \sin(300^\circ + 45^\circ)$

$$\sin 300^\circ \cos 45^\circ + \cos 300^\circ \sin 45^\circ$$

$$= -\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$$

$$= \frac{-\sqrt{6} + \sqrt{2}}{4} = \boxed{\frac{-\sqrt{6} + \sqrt{2}}{4}}$$

10.) $\cos 285^\circ = \cos(240^\circ + 45^\circ)$

$$= \cos 240^\circ \cos 45^\circ - \sin 240^\circ \sin 45^\circ$$

$$= -\frac{1}{2} \cdot \frac{\sqrt{2}}{2} - \left(-\frac{\sqrt{3}}{2}\right) \cdot \frac{\sqrt{2}}{2}$$

$$= \frac{-\sqrt{2} + \sqrt{6}}{4} = \boxed{\frac{-\sqrt{2} + \sqrt{6}}{4}}$$

18) Show $\cos 3t = 4\cos^3 t - 3\cos t$

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

$$= \cos 2t \cos t - \sin 2t \sin t$$

$$= (2\cos^2 t - 1)\cos t - 2\sin t \cos t \sin t$$

$$= 2\cos^3 t - \cos t - 2\cos t \sin^2 t$$

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

$$= 2\cos^3 t - \cos t - 2\cos t + 2\cos^3 t$$

$$= 4\cos^3 t - 3\cos t$$

Try to get
only cosine in
function