Find

Hint: See page 112

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

$$\sin 15^\circ = \sin(45^\circ - 30^\circ)$$

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

$$\cos 15^\circ = \cos(45^\circ - 30^\circ)$$

These **Angle Sum/Difference Identities for Sine**

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$

These **Angle Sum/Difference Identities for Cosine**

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$

Using your trig tables and the sum/difference identities

Find

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

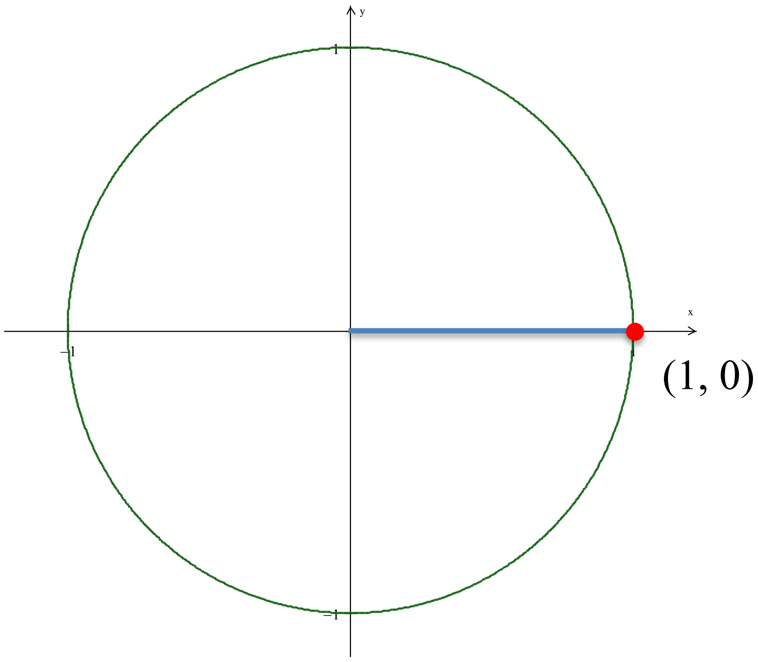
$$\sin 15^\circ = \sin(45)\cos 30 - \cos 45 \sin 30$$

$$\cos 75^\circ = \cos(45)\cos 30 - \sin 45 \sin 30$$

$$\cos 15^\circ = \cos(45)\cos 30 + \sin 45 \sin 30$$

	0°	30°	45°	60°	90°	120°	135°	150°	180°
θ^{rad}	0^{rad}								
$\sin\theta$	$\frac{\sqrt{0}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$
$\cos\theta$	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$	$-\frac{\sqrt{1}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{4}}{2}$

Notice that the angles we just used were the special angles from your trig tables…



Using your trig tables and the sum/difference identities

Find

$$\sin 75° = \sin(45)\cos 30 + \cos 45 \sin 30$$

$$\sin 15° = \sin(45)\cos 30 - \cos 45 \sin 30$$

$$\cos 75° = \cos(45)\cos 30 - \sin 45 \sin 30$$

$$\cos 15° = \cos(45)\cos 30 + \sin 45 \sin 30$$

Using your trig tables and the sum/difference identities

Find

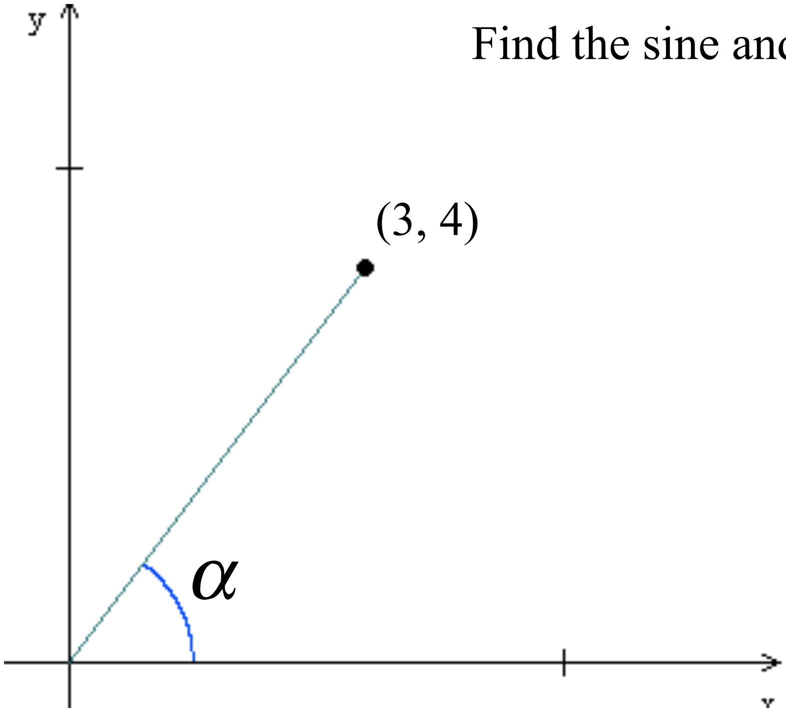
$$\sin 75° = \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}+\frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}+\sqrt{2}}{4}$$

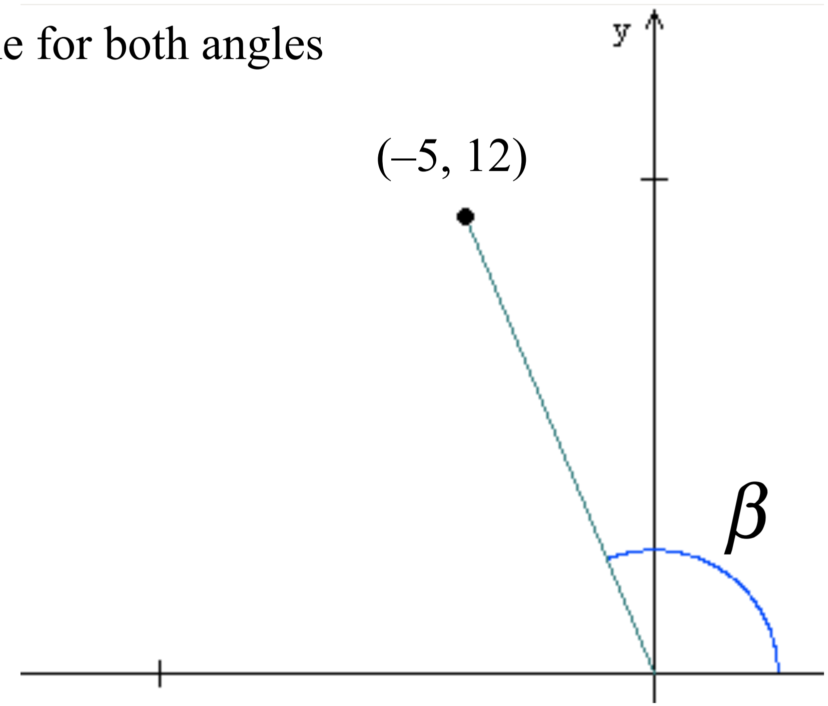
$$\sin 15° = \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}-\frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}-\sqrt{2}}{4}$$

$$\cos 75° = \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}-\frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}-\sqrt{2}}{4}$$

$$\cos 15° = \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}+\frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}+\sqrt{2}}{4}$$

Find the sine and cosine for both angles





$$\sin\alpha = \frac{4}{5}$$

$$\cos\alpha = \frac{3}{5}$$

$$\sin\beta = \frac{12}{13}$$

$$\cos\beta = -\frac{5}{13}$$

Use the answers you have and the composite identities to solve the given problems

$$\sin\alpha = \frac{4}{5} \qquad \cos\alpha = \frac{3}{5} \qquad \sin\beta = \frac{12}{13} \qquad \cos\beta = -\frac{5}{13}$$

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta = \frac{4}{5}\left(-\frac{5}{13}\right) + \frac{3}{5}\left(\frac{12}{13}\right) = -\frac{20}{65} + \frac{36}{65} = \frac{16}{65}$$

$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta = \frac{4}{5}\left(-\frac{5}{13}\right) - \frac{3}{5}\left(\frac{12}{13}\right) = -\frac{20}{65} - \frac{36}{65} = -\frac{56}{65}$$

$$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta = \frac{3}{5}\left(-\frac{5}{13}\right) - \frac{4}{5}\left(\frac{12}{13}\right) = -\frac{15}{65} - \frac{48}{65} = -\frac{63}{65}$$

$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta = \frac{3}{5}\left(-\frac{5}{13}\right) + \frac{4}{5}\left(\frac{12}{13}\right) = -\frac{15}{65} + \frac{48}{65} = \frac{33}{65}$$

From these answers, in what quadrant do the angles $\alpha+\beta$ and $\alpha-\beta$ terminate?

Using your trig tables and the sum/difference identities

Find

$$\sin 165° = \sin(135° + 30°)$$

$$= \sin(135)\cos 30 + \cos 135 \sin 30$$

$$\cos 255° = \cos(315° - 60°)$$

$$= \cos(315)\cos 60 + \sin 315 \sin 60$$

$$= \cos(225° + 30°)$$

$$= \cos(225)\cos 30 - \sin 225 \sin 30$$

Using your trig tables and the sum/difference identities

Find

$$\sin 165° = \sin(135° + 30°)$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$\cos 255° = \cos(315° - 60°)$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{1}{2} - \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{2} - \sqrt{6}}{4}$$

$$= \cos(225° + 30°)$$

$$= -\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{-\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{2} - \sqrt{6}}{4}$$

Using your trig tables and the sum/difference identities

Find x

$$\sin(2x)\cos 10 + \cos 2x \sin 10 = \frac{1}{2}$$

$$\sin(2x + 10) = \frac{1}{2}$$

$$2x + 10 = 30° \pm 360n$$

$$= 150° \pm 360n$$

$$2x = 20° \pm 360n$$

$$= 140° \pm 360n$$

$$x = 10° \pm 180n$$

$$= 70° \pm 180n$$

Using your trig tables and the sum/difference identities

Find x

$$\cos(25)\cos 5x + \sin 25 \sin 5x = -\frac{\sqrt{2}}{2}$$

$$\cos(25 - 5x) = -\frac{\sqrt{2}}{2}$$

$$25 - 5x = 135° \pm 360n$$

$$= 225° \pm 360n$$

$$-5x = 110° \pm 360n$$

$$= 200° \pm 360n$$

$$x = -22° \pm 72n$$

$$= -40° \pm 72n$$

Using your trig tables and the sum/difference identities

Find x

$$\cos(25)\cos 5x + \sin 25 \sin 5x = -\frac{\sqrt{2}}{2}$$

$$\cos(25 - 5x) = -\frac{\sqrt{2}}{2}$$

If we want to express our answers as the smallest positive angles…

$$x = -22^\circ \pm 72n$$

$$= -40^\circ \pm 72n$$

$$x = 50^\circ \pm 72n$$

$$= 32^\circ \pm 72n$$

Using your trig tables and the sum/difference identities

Find x

$$\cos(25)\cos 5x + \sin 25 \sin 5x = -\frac{\sqrt{2}}{2}$$

What if we only want to find solutions between 0º and 360º…

$$\cos(25 - 5x) = -\frac{\sqrt{2}}{2}$$

$$x = 50° \pm 72n$$

$$= 32° \pm 72n$$

Remember that we just divided by –5 so instead of 2 solutions between 0º and 360º…

…we get 10 solutions.

$$x = 50° \pm 72n = 50°, 122°, 194°, 266°, 338°$$

$$= 32° \pm 72n = 32°, 104°, 176°, 248°, 320°$$

Using your trig tables and the sum/difference identities

Find x

$$\sin(2x)\cos 10 + \cos 2x \sin 10 = \frac{1}{2}$$

$$\sin(2x+10) = \frac{1}{2}$$

$$2x + 10 = 30^\circ \pm 360n$$

$$= 150^\circ \pm 360n$$

$$2x = 20^\circ \pm 360n$$

$$= 140^\circ \pm 360n$$

$$x = 10^\circ \pm 180n$$

$$= 70^\circ \pm 180n$$

Assignment 3-3: Pg. 118 #1 a) b), 2 a) b), 3, 4, 5, 8, 10