

**Instructions:** Show all work. Use exact answers unless specifically asked to round. Answer all parts of each question.

1. Solve the equations.

a.  $\cos x = \sin 2x$

$$\cos x - \sin 2x = 0$$

$$\cos x - 2 \sin x \cos x = 0$$

$$\cos x (1 - 2 \sin x) = 0$$

$$\cos x = 0 \Rightarrow \boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}} \pm 2\pi$$

b.  $3 \cos^2 x - 8 \cos x - 3 = 0$

$$(3 \cos x + 1)(\cos x - 3) = 0$$

$\cos x = 3$  no solution

$$\cos x = -\frac{1}{3} \quad x \approx .945, x \approx 5.34 \pm 2\pi$$

c.  $2 \sin 3x + \sqrt{3} = 0$

$$\sin 3x = -\frac{\sqrt{3}}{2}$$

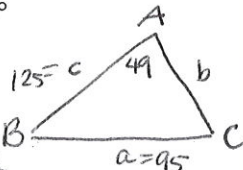
$$3x = \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{10\pi}{3}, \frac{11\pi}{3}, \frac{16\pi}{3}, \frac{17\pi}{3}$$

$$x = \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{10\pi}{9}, \frac{11\pi}{9}, \frac{16\pi}{9}, \frac{17\pi}{9} \pm 2\pi$$

2. Find the triangle(s) with the following properties. Use the law of sines or cosines as appropriate. Round degrees and sides to 1 decimal place.

a.  $a = 95, c = 125, A = 49^\circ$

Triangle #1  
 $b = 93.2, C = 83.2^\circ, B = 47.8^\circ$   
 b.  $a = 4, b = 7, c = 6$



$$\frac{\sin 49^\circ}{95} = \frac{\sin C}{125} \Rightarrow C = 83.2^\circ$$

$$B = 47.8^\circ$$

$$\frac{\sin 49^\circ}{95} = \frac{\sin 47.8^\circ}{b} \Rightarrow b = \frac{95 \sin 47.8^\circ}{\sin 49^\circ}$$

$$b = 93.2$$

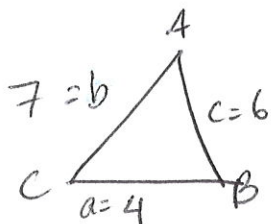
$$C \Rightarrow 96.8^\circ$$

$$B = 34.2^\circ$$

$$\frac{\sin 49^\circ}{95} = \frac{\sin 34.2^\circ}{b} \Rightarrow b = \frac{95 \sin 34.2^\circ}{\sin 49^\circ}$$

$$b = 70.8$$

Triangle #2  $b = 70.8, c = 96.8, B = 34.2^\circ$



$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab}$$

$$C = 58.8^\circ$$

$$\cos B = \frac{b^2 - a^2 - c^2}{-2ac}$$

$$B = 86.4^\circ$$

$$A = 34.8^\circ$$