

Name: Answers

Date: _____

Homework: Solving Trigonometric Equations (Day 1)

Honors PreCalculus

*Find all solutions.

Textbook (Pages 465-467) – Problems 11, 13, 14, 15, 19, 23, 27, 29 (Find all solutions), 105

11) $2\sin\theta + 3 = 2$

$$2\sin\theta = -1 \quad \begin{array}{c} S \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad A \quad \frac{\pi}{6}$$
$$\sin\theta = -\frac{1}{2} \quad \begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad \& \quad \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$\theta = \frac{7\pi}{6} \pm 2\pi n, \quad \frac{11\pi}{6} \pm 2\pi n$$

14) $\tan^2\theta = \frac{1}{3}$

$$\sqrt{\tan^2\theta} = \sqrt{\frac{1}{3}}$$

$$\tan\theta = \pm \frac{1}{\sqrt{3}} \quad \begin{array}{c} S \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad A \quad \frac{\pi}{6}$$
$$\tan\theta = \pm \frac{\sqrt{3}}{3} \quad \begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad \& \quad \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$\theta = \frac{\pi}{6} \pm 2\pi n, \frac{5\pi}{6} \pm 2\pi n, \quad \frac{7\pi}{6} \pm 2\pi n, \frac{11\pi}{6} \pm 2\pi n$$

or

$$\theta = \frac{\pi}{6} \pm \pi n, \frac{5\pi}{6} \pm \pi n$$

19) $\cos(2\theta) = -\frac{1}{2}$

$$a = 2\theta \quad \begin{array}{c} 2\pi \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad S \quad A \quad \frac{\pi}{3}$$
$$\cos a = -\frac{1}{2} \quad \begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad \& \quad \frac{4\pi}{3}$$

$$a = \frac{2\pi}{3} \pm 2\pi n \quad a = \frac{4\pi}{3} \pm 2\pi n$$

$$2\theta = \frac{2\pi}{3} \pm 2\pi n \quad 2\theta = \frac{4\pi}{3} \pm 2\pi n$$

divide by 2 divide by 2

$$\theta = \frac{\pi}{3} \pm \pi n \quad \theta = \frac{2\pi}{3} \pm \pi n$$

$$\theta = \frac{\pi}{3} \pm \pi n \quad \theta = \frac{2\pi}{3} \pm \pi n$$

13) $4\cos^2\theta = 1$

$$\cos^2\theta = \frac{1}{4} \quad \begin{array}{c} 2\pi \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad S \quad A \quad \frac{\pi}{3}$$
$$\sqrt{\cos^2\theta} = \sqrt{\frac{1}{4}}$$
$$\cos\theta = \pm \frac{1}{2} \quad \begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad \& \quad \frac{4\pi}{3}, \frac{5\pi}{3}$$

$$\theta = \frac{\pi}{3} \pm 2\pi n, \frac{2\pi}{3} \pm 2\pi n, \frac{4\pi}{3} \pm 2\pi n, \frac{5\pi}{3} \pm 2\pi n$$

OR

$$\theta = \frac{\pi}{3} \pm \pi n, \frac{2\pi}{3} \pm \pi n$$

15) $2\sin^2\theta - 1 = 0$

$$\sin^2\theta = \frac{1}{2} \quad \begin{array}{c} 3\pi \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad S \quad A \quad \frac{\pi}{4}$$
$$\sqrt{\sin^2\theta} = \sqrt{\frac{1}{2}}$$
$$\sin\theta = \pm \frac{1}{\sqrt{2}}$$
$$\sin\theta = \pm \frac{\sqrt{2}}{2}$$

$$\theta = \frac{\pi}{4} \pm 2\pi n, \frac{3\pi}{4} \pm 2\pi n, \frac{5\pi}{4} \pm 2\pi n, \frac{7\pi}{4} \pm 2\pi n$$

OR

$$\theta = \frac{\pi}{4} \pm \pi n, \frac{3\pi}{4} \pm \pi n$$

23) $2\sin\theta + 1 = 0$

$$\sin\theta = -\frac{1}{2} \quad \begin{array}{c} S \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad A \quad \frac{\pi}{6}$$
$$\begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \quad \& \quad \frac{\pi}{6}, \frac{11\pi}{6}$$

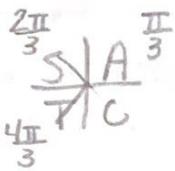
$$\theta = \frac{7\pi}{6} \pm 2\pi n, \frac{11\pi}{6} \pm 2\pi n$$

$$27) 4\sec\theta + 6 = -2$$

$$4\sec\theta = -8$$

$$\sec\theta = -2$$

$$\cos\theta = -\frac{1}{2}$$



$$\theta = \frac{2\pi}{3} + 2\pi n, \frac{4\pi}{3} + 2\pi n$$

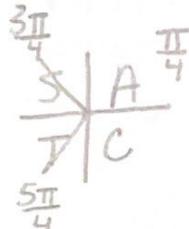
$$29) 3\sqrt{2}\cos\theta + 2 = -1$$

$$3\sqrt{2}\cos\theta = -3$$

$$\cos\theta = \frac{-3}{3\sqrt{2}}$$

$$\cos\theta = -\frac{1}{\sqrt{2}}$$

$$\cos\theta = -\frac{\sqrt{2}}{2}$$



$$\theta = \frac{3\pi}{4} + 2\pi n, \frac{5\pi}{4} + 2\pi n$$

$$105) d(x) = 70\sin(0.65x) + 150$$

$$a) x=0 \quad d(0) = 70\sin(0.65(0)) + 150$$

$$= 70\sin(0) + 150 \quad + : (1, 0)$$

$$= 70(0) + 150$$

$$= 150 \text{ miles}$$

$$b) d=100$$

$$100 = 70\sin(0.65x) + 150$$

$$-100 \quad -100$$

$$0 = 70\sin(0.65x) + 50$$

Graph in calculator.

Change window

$x\text{-max}$ should go to at least 20

2nd Calc. zeros between $x=0$ and $x=20$

$$x = 6.057 \text{ min}, 8.442 \text{ min}, 15.724 \text{ min}, 18.109 \text{ min.}$$

c) Before 6.057 min,

between 8.442 min and 15.724 min,

and after 18.109 min

a) NO.

(You can plug in 70 for d (like we did $d=100$ in part b) and you can see there are no places where the graph crosses the $x\text{-axis}$)