*Find all solutions.

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

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

$2\sin\theta = -1$

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

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

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

$\cos^2\theta = \frac{1}{4}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{1}{4}}$

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

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

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

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

$\tan\theta = \pm\frac{1}{\sqrt{3}}$

$\tan\theta = \pm\frac{\sqrt{3}}{3}$

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

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

$\sin^2\theta = \frac{1}{2}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{1}{2}}$

$\sin\theta = \pm\frac{1}{\sqrt{2}}$

$\sin\theta = \pm\frac{\sqrt{2}}{2}$

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

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

$a = 2\theta$

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

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

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

↗ divide by 2 ↗ divide by 2

$\theta = \frac{2\pi}{6} \pm \pi n \qquad \theta = \frac{4\pi}{6} \pm \pi n$

$\boxed{\theta = \frac{\pi}{3} \pm \pi n \qquad \theta = \frac{2\pi}{3} \pm \pi n}$
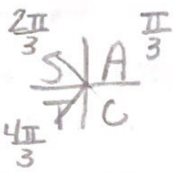
23) $2\sin\theta + 1 = 0$

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

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

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

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

$\quad \sec\theta = -2$

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

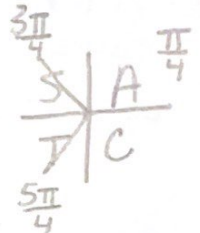$\boxed{\theta = \frac{2\pi}{3} \pm 2\pi n, \quad \frac{4\pi}{3} \pm 2\pi n}$

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

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

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

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

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

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

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

a) $x=0 \quad d(0) = 70\sin(.65(0)) + 150$

$\qquad = 70\sin(0) + 150 \qquad \to (1,0)$

$\qquad = 70(0) + 150$

$\qquad \boxed{= 150 \text{ miles}}$

b) $d=100 \qquad \underset{-100}{100} = 70\sin(.65x) + \underset{-100}{150}$

$\qquad 0 = 70\sin(.65x) + 50$

Graph in Calculator.

Change Window

X-max should go to at least 20

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

$x = 6.057$ min, 8.442 min, 15.724 min, 18.109 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-axis)