Answer Key 16

7.4: 17, 18, 21, 22, 25, 33, 41, 42
7.5: 4, 10, 17, 18
8.1: 5-9 (On one graph), 17-20, 29-32, 37-40
8.4: 29, 30, 31, 49, 50, 65, 66, 83, 85

7.4

17)

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

$\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) = 150^\circ, 210^\circ$

So 6 possible solutions are

$150^\circ, 510^\circ, 870^\circ,$

$210^\circ, 560^\circ, 920^\circ$

18)

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

$\cos^{-1}\left(\frac{1}{2}\right) = 60^\circ, 300^\circ$

So 6 possible solutions are

$60^\circ, 420^\circ, 780^\circ,$

$300^\circ, 660^\circ, 1020^\circ$

21)

$\cos\theta = .28$

$\cos^{-1}(.28) \approx 73.74^\circ,$

$360^\circ - 73.74^\circ = 286.26^\circ$

So 6 possible solutions are

$73.74^\circ, 73.74^\circ + 360^\circ, 73.74^\circ + 720^\circ,$

$286.26^\circ, 286.26^\circ + 360^\circ,$

$286.26^\circ + 720^\circ$

22)

$\tan\theta = 2.5$

$\tan^{-1}(2.5) \approx 68.20$

So 6 possible solutions are

$68.20, 68.20 + 180^\circ, 68.20 + 360^\circ,$

$68.20 + 540^\circ, 68.20 + 720^\circ,$

$68.20 + 900^\circ$

25)

$\cos\theta + 1 = 0$

$\cos\theta = -1$

$\theta = \pi + 2\pi n$

33)

$2\cos^2\theta - 1 = 0$

$\cos 2\theta = 1$

$2\theta = 0 + 2\pi n$

$\theta = \pi n$

41)

$4\cos^2\theta - 4\cos\theta + 1 = 0$

$(2\cos\theta - 1)^2 = 0$

$2\cos\theta - 1 = 0$

$\cos\theta = 1$

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

42)

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

$\sin\theta = \frac{2 \pm \sqrt{4+8}}{4} = \frac{2 \pm \sqrt{12}}{4} = \frac{1 \pm \sqrt{3}}{2}$

$\frac{1+\sqrt{3}}{2} > 1 \quad \sin^{-1}\left(\frac{1-\sqrt{3}}{2}\right) \approx 338.53^\circ, 201.47^\circ$

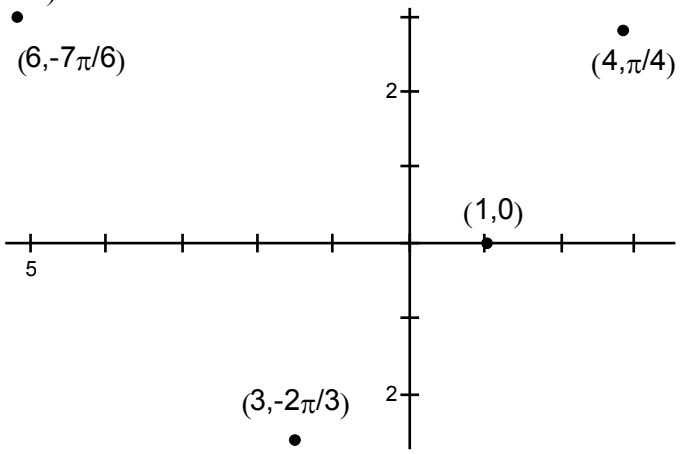
$\theta = 338.53^\circ + 360^\circ n, 201.47^\circ + 360^\circ n$

7.5

4)	10)
$\sin^2\theta = 4 - 2\cos^2\theta$ $\sin^2\theta + 2\cos^2\theta = 4$ $1 + \cos^2\theta = 4$ $\cos^2\theta = 3$ $\cos\theta = \pm\sqrt{3} \approx 1.4$ So no solutions	$\cos 2\theta = \cos^2\theta - 1/2$ $2\cos^2\theta - 1 = \cos^2\theta - 1/2$ $\cos^2\theta - 1/2 = 0$ $\cos\theta = \pm 1/2$ $\theta = \frac{\pi}{3} + 2\pi n, \frac{-\pi}{3} + 2\pi n,$
17)	18)
$2\cos 3\theta = 1$ $\cos 3\theta = 1/2$ $3\theta = 60^\circ + 360^\circ n, -60^\circ + 360^\circ n$ $\theta = 20^\circ + 120^\circ n, -20^\circ + 120^\circ n$	$2\sin 2\theta = 1$ $\sin 2\theta = 1/2$ $2\theta = 30^\circ + 360^\circ n, 150^\circ + 360^\circ n$ $\theta = 15^\circ + 180^\circ n, 75^\circ + 180^\circ n$

8.1

5-9)



17) Q	18) R
19) Q	20) P
29) $x = 4\cos(\pi/6) = 2\sqrt{3}$ $y = 4\sin(\pi/6) = 2$	30) $x = 6\cos(2\pi/3) = -3$ $y = 6\sin(2\pi/3) = 3\sqrt{3}$
31) $x = \sqrt{2}\cos(-\pi/4) = 1$ $y = \sqrt{2}\sin(\pi/4) = -1$	32) $x = -\cos(5\pi/2) = 0$ $y = -\sin(5\pi/2) = -1$

37)

$R=\sqrt{(-1)^2+1^2}=\sqrt{2}$

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

38)

$R=\sqrt{\left(3\sqrt{3}\right)^2+(-3)^2}=6$

$\theta=\tan^{-1}\left(-1/\sqrt{3}\right)=\frac{11\pi}{6}$

39)

$R=\sqrt{\left(\sqrt{8}\right)^2+\left(\sqrt{8}\right)^2}=4$

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

40)

$R=\sqrt{\left(-\sqrt{6}\right)^2+\left(-\sqrt{2}\right)^2}=2\sqrt{2}$

$\theta=\tan^{-1}\left(1/\sqrt{3}\right)=\frac{7\pi}{6}$

8.4

29)

$\sqrt{2}\left(\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right)$

30)

$\sqrt{2}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)$

31)

$2\sqrt{2}\left(\cos\frac{3\pi}{4}+i\sin\frac{3\pi}{4}\right)$

49)

$3\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)\cdot 2\left(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}\right)$

$=6\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)$

50)

$\sqrt{3}\left(\cos\frac{5\pi}{4}+i\sin\frac{5\pi}{4}\right)\cdot 2(\cos\pi+i\sin\pi)$

$=2\sqrt{3}\left(\cos\frac{9\pi}{4}+i\sin\frac{9\pi}{4}\right)$

65)

$\left(-\sqrt{3}+i\right)^6=\left[2\left(\cos\frac{11\pi}{6}+i\sin\frac{11\pi}{6}\right)\right]^6=$

$2^6(\cos 11\pi+i\sin 11\pi)=$

$64(\cos\pi+i\sin\pi)=-64$

66)

$(1-i)^{10}=\sqrt{2}^{10}\cdot\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)^{10}=$

$32\left(\cos\frac{70\pi}{4}+i\sin\frac{70\pi}{4}\right)=32\left(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}\right)=$

$-32i$

83)

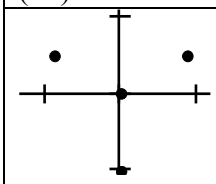
$i=\cos\left(\frac{\pi}{2}+2\pi n\right)+i\sin\left(\frac{\pi}{2}+2\pi n\right)$

$\sqrt[3]{i}=\cos\left(\frac{\pi+4\pi n}{6}\right)+i\sin\left(\frac{\pi+4\pi n}{6}\right)=$

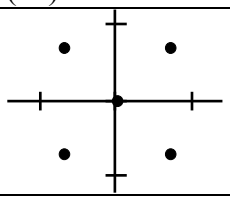
$\cos\frac{\pi}{6}+i\sin\frac{\pi}{6},\cos\frac{5\pi}{6}+i\sin\frac{5\pi}{6},\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}$

$\frac{\sqrt{3}+i}{2},\frac{-\sqrt{3}+i}{2},-i$

(83)



(85)



85)

$-1=\cos(\pi+2\pi n)+i\sin(\pi+2\pi n)$

$(-1)^{1/4}=\cos\left(\frac{\pi+2\pi n}{4}\right)+i\sin\left(\frac{\pi+2\pi n}{4}\right)$

$\frac{\pm 1}{\sqrt{2}}+i\frac{\pm 1}{\sqrt{2}}$