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pg. 557 #1-3, 26-31 all, 36-39 all, 47, 61-64 all

1. $(2, \pi/4)$

$x = 2\cos \pi/4 = 2\left(\frac{\sqrt{2}}{2}\right) = \sqrt{2}$

$y = 2\sin \pi/4 = 2\left(\frac{\sqrt{2}}{2}\right) = \sqrt{2}$

$\boxed{(\sqrt{2}, \sqrt{2})}$

2. $\left(\frac{1}{4}, \pi/2\right)$

$x = 2\cos(\pi/2) = 2(0) = 0$

$y = 2\sin(\pi/2) = 2(1) = 2$

$\boxed{(0, 2)}$

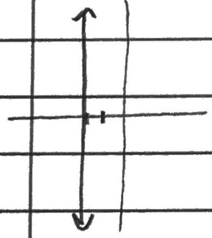
3. $(5, 240°)$

$x = 5\cos 240° = 5\left(-\frac{1}{2}\right) = -\frac{5}{2}$

$y = 5\sin 240° = 5\left(-\frac{\sqrt{3}}{2}\right) = -\frac{5\sqrt{3}}{2}$

$\boxed{\left(-\frac{5}{2}, -\frac{5\sqrt{3}}{2}\right)}$

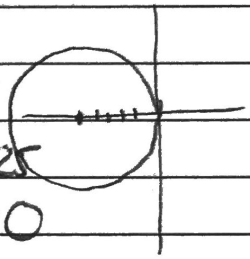
26. $x = -2$



$-2 = r\cos\theta$

$\boxed{\frac{-2}{\cos\theta} = r}$

27. $(x+5)^2 + y^2 = 25$



$(r\cos\theta + 5)^2 + (r\sin\theta)^2 = 25$

$r^2\cos^2\theta + 10r\cos\theta + 25 + r^2\sin^2\theta = 25$

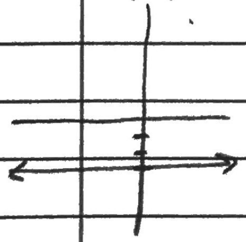
$r^2(\cos^2\theta + \sin^2\theta) + 10r\cos\theta = 0$

$r^2 + 10r\cos\theta = 0$

$r + 10\cos\theta = 0$

$\boxed{r = -10\cos\theta}$

28. $y = -3$



$-3 = r\sin\theta$

$\boxed{\frac{-3}{\sin\theta} = r}$

29. $x = y^2$

$r\cos\theta = (r\sin\theta)^2$

$r\cos\theta = r^2\sin^2\theta$

$\cos\theta = r\sin^2\theta$

$\frac{\cos\theta}{\sin^2\theta} = r$

$\boxed{\cot\theta \cdot \csc\theta = r}$

30. $(x-2)^2+y^2=4$

$(r\cos\theta-2)^2+(r\sin\theta)^2=4$

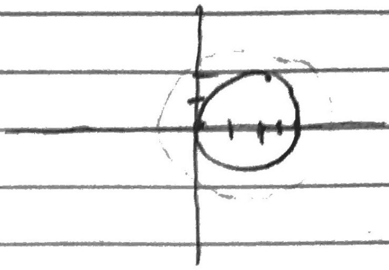
$r^2\cos^2\theta-4r\cos\theta+4+r^2\sin^2\theta=4$

$r^2(\cos^2\theta+\sin^2\theta)-4r\cos\theta=0$

$r^2-4r\cos\theta=0$

$r-4\cos\theta=0$

$\boxed{r=4\cos\theta}$



31. $(x-1)^2-y^2=1$

$(r\cos\theta-1)^2-(r\sin\theta)^2=1$

$r^2\cos^2\theta-2r\cos\theta+\cancel{1}-r^2\sin^2\theta=\cancel{1}$

$r^2\cos^2\theta-2r\cos\theta-r^2\sin^2\theta=0$

$r^2(\cos^2\theta-\sin^2\theta)-2r\cos\theta$

$r(\cos^2\theta-\sin^2\theta)-2\cos\theta=0$

$r(\cos^2\theta-\sin^2\theta)=2\cos\theta$

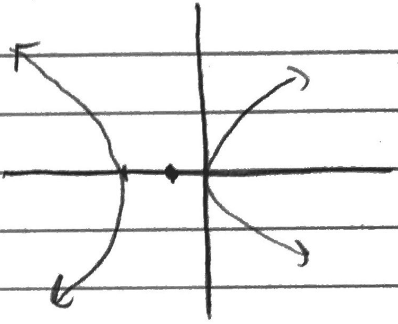
$r=\dfrac{2\cos\theta}{\cos^2\theta-\sin^2\theta}$

$r=\dfrac{2\cos\theta}{1-\sin^2\theta-\sin^2\theta}$

$r=\dfrac{2\cos\theta}{1-2\sin^2\theta}$

$r=\dfrac{2\cos\theta}{\cos 2\theta}=2\cdot\dfrac{1}{\cos 2\theta}\cdot\cos\theta$

$=\boxed{2\sec 2\theta\cdot\cos\theta}$



36. $r=3\sin\theta$

$r^2=3r\sin\theta$

$x^2+y^2=3y$

$x^2+y^2-3y=0$

$x^2+\left(y-\frac{3}{2}\right)^2-\frac{9}{4}=0$

$\boxed{x^2+\left(y-3/2\right)^2=9/4}$

37. $\theta=-\pi/3$

$-\frac{\pi}{3}=\tan^{-1}\left(\frac{y}{x}\right)$

$\tan(-\pi/3)=\frac{y}{x}$

$\tan(5\pi/3)=\frac{y}{x}$

$\frac{\frac{-\sqrt{3}}{2}}{\frac{1}{2}}=\frac{y}{x}$

$-\sqrt{3}=\frac{y}{x}$

$\boxed{-\sqrt{3}\cdot x=y}$

38. $r=10$

$10=\sqrt{x^2+y^2}$

$\boxed{100=x^2+y^2}$

39. $r=4\cos\theta$

$r^2=4r\cos\theta$

$x^2+y^2=4x$

$x^2-4x+y^2=0$

$(x-2)^2-4+y^2=0$

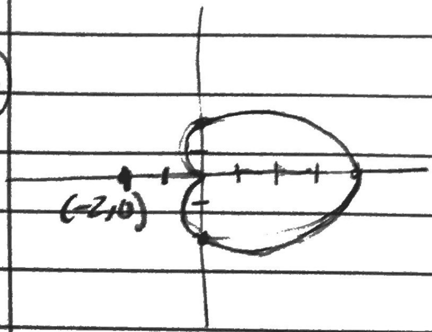
$\boxed{(x-2)^2+y^2=4}$

47. $\overset{a+b\cos\theta}{r=2+2\cos\theta}$ $a=b\rightarrow$ cardioid

intercepts $=\pm2$

length $=4$

a)



b) no, (-2,0) is behind the microphone

61. $y = -4$

$r\sin\theta = -4$

$\boxed{r = \frac{-4}{\sin\theta}}$

62. $\theta = \frac{2\pi}{3}$

$\frac{2\pi}{3} = \tan^{-1}\left(\frac{y}{x}\right)$

$\tan\left(\frac{2\pi}{3}\right) = \frac{y}{x}$

$\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{y}{x}$

$-\sqrt{3} = \frac{y}{x}$

$\boxed{-\sqrt{3} \cdot x = y}$

63. $r = 4\sin\theta$

$r^2 = 4r\sin\theta$

$x^2 + y^2 = 4y$

$x^2 + y^2 - 4y = 0$

$x^2 + (y-2)^2 - 4 = 0$

$\boxed{x^2 + (y-2)^2 = 4}$

64. $(x-3)^2 + (y+4)^2 = 25$

$(r\cos\theta - 3)^2 + (r\sin\theta + 4)^2 = 25$

$r^2\cos^2\theta - 6r\cos\theta + \cancel{9} + r^2\sin^2\theta + 8r\sin\theta + \cancel{16} = \cancel{25}$

$r^2\cos^2\theta - 6r\cos\theta + r^2\sin^2\theta + 8r\sin\theta = 0$

$r^2(\cos^2\theta + \sin^2\theta) - 6r\cos\theta + 8r\sin\theta = 0$

$r^2 - 6r\cos\theta + 8r\sin\theta = 0$

$r - 6\cos\theta + 8\sin\theta = 0$

$\boxed{r = 6\cos\theta - 8\sin\theta}$