§9.06

\# 1. a) and e) both label the Cartesian point $(3,0)$.
b) and g) both label the Cartesian point $(-3,0)$.
c) and h) both label the Cartesian point $(-1,\sqrt{3})$.
d) and f) both label the Cartesian point $(1,\sqrt{3})$.
Clearly there are no further identities.

\# 3. a) $(2,\frac{\pi}{2}+2\pi k)$ and $(-2,\frac{3\pi}{2}+2\pi k)$, k any integer are all the polar coordinates for this point, $(\sqrt{2},\sqrt{2})$ in Cartesian corrdinates.
b) $(2,2\pi k)$ and $(-2,\pi+2\pi k)$, k any integer are all the polar coordinates for this point, $(2,0)$ in Cartesian corrdinates.
c) $(-2,\frac{\pi}{2}+2\pi k)$ and $(2,\frac{3\pi}{2}+2\pi k)$, k any integer are all the polar coordinates for this point, $(-\sqrt{2},-\sqrt{2})$ in Cartesian corrdinates.
d) $(-2,2\pi k)$ and $(2,\pi+2\pi k)$, k any integer are all the polar coordinates for this point, $(-2,0)$ in Cartesian corrdinates.

\# 5. The answers are written in #1 above.

\# 7. $r=2$ is a circle centered at the pole with radius 2.

\# 11. This is a wedge with its tip at the pole.

\# 13. This is a piece of the line through the origin with slope $\tan\left(\frac{\pi}{3}\right)=\sqrt{3}$. The left-most point on the line has Cartesian coordinates $(\frac{-\sqrt{3}}{2},\frac{-1}{2})$ and the right-most point has Cartesian coordinates $(\frac{3\sqrt{3}}{2},\frac{3}{2})$.

\# 23. $r\cos\theta=2$ or $x=2$: a vertical line whose x coordinate is 2.

\# 29. $r\cos\theta+r\sin\theta=1$, or $x+y=1$. The line with slope -1 through the Cartesian point $(1,0)$.

\# 31. $r^2=1$, or $x^2+y^2=1$ which is the circle centered at the origin with radius 1.

\# 37. $r=\csc\theta\ e^{r\cos\theta}$, or $r\sin\theta=e^{r\cos\theta}$, so $y=e^x$ which is the standard graph of the exponential function.

\# 55. $\dfrac{x^2}{9}+\dfrac{y^2}{4}=1$, or $\dfrac{r^2\cos^2\theta}{9}+\dfrac{r^2\sin^2\theta}{4}=1$. One can now write this in many forms. Multiply both sides by 36 to get the answer in the back of the book.