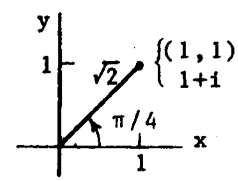
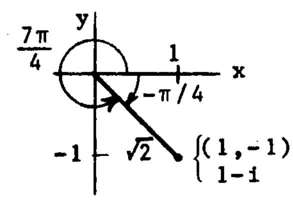
Chapter 2

Section 4

2-4.1. $1+i$ is $x+iy$ with $x=1$, $y=1$; we plot the point $(1,1)$ and find from the figure $r=\sqrt{2}$, $\theta=\pi/4$. Then the 5 ways to label the point are: $(1,1)$, $1+i$, $(\sqrt{2},\pi/4)$, $\sqrt{2}\left(\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right)$, $\sqrt{2}e^{i\pi/4}$. The complex conjugate of $1+i$ is $1-i$; this point may be labeled: $(1,-1)$, $1-i$, $(\sqrt{2},-\pi/4)$ or $(\sqrt{2},7\pi/4)$, $\sqrt{2}\left(\cos\frac{\pi}{4}-i\sin\frac{\pi}{4}\right)$ or $\sqrt{2}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)$, $\sqrt{2}e^{-i\pi/4}$ or $\sqrt{2}e^{7i\pi/4}$.





2-4.7. $-1=x+iy$ with $x=-1$, $y=0$. We plot the point $(-1,0)$. The 5 ways of labeling the point are: $(-1,0)$, -1, $(1,\pi)$, $\cos\pi+i\sin\pi$, $e^{i\pi}$. The complex conjugate of -1 is -1; any real number is its own complex conjugate. If we take the complex conjugate of $e^{i\pi}$, we get $e^{-i\pi}$; from the figure we see that these are equal since the point $r=1$, $\theta=-\pi$ is the same as the point $r=1$, $\theta=\pi$, so $e^{-i\pi}=-1=e^{i\pi}$. Similarly $\cos\pi+i\sin\pi=\cos\pi-i\sin\pi=-1$ since $\sin\pi=0$.