Calculator Radians

Key

1. Convert the following complex number into polar form:

a. $\sqrt{3}+i$ modulus $\sqrt{(\sqrt{3})^2+(-1)^2}=2$ $\tan^{-1}\frac{-1}{\sqrt{3}}=\frac{-\sqrt{3}}{3}=\frac{11\pi}{6}$ a. $2\,\mathrm{cis}\,\frac{11\pi}{6}$

b. $9\sqrt{3}+9i$ $\sqrt{(9\sqrt{3})^2+9^2}=\sqrt{324}=18$ $\tan^{-1}\frac{9}{9\sqrt{3}}=\frac{1}{\sqrt{3}}=\frac{\pi}{6}$ $18\,\mathrm{cis}\,\frac{\pi}{6}$ b.

c. $3-4i$ $\sqrt{(-4)^2+(3)^2}=5$ $\tan^{-1}\frac{-4}{3}=-.93$ $5\,\mathrm{cis}(-.93)$ $+2\pi$ $5\,\mathrm{cis}\,5.4$ c.

d. $\sqrt{5}-i$ $\sqrt{(\sqrt{5})^2+(-1)^2}=\sqrt{6}$ $\tan^{-1}\frac{-1}{\sqrt{5}}$ $\sqrt{6}\,\mathrm{cis}(-.42+2\pi)$ $\sqrt{6}\,\mathrm{cis}\,5.9$ d. $+2\pi=$

2. Convert the following complex numbers into rectangular form:

a. $3(\cos 210^\circ + i\sin 210^\circ)$ $x=3\cos 210$ $x=3\left(-\frac{\sqrt{3}}{2}\right)=-\frac{3\sqrt{3}}{2}$ $y=3\sin 210$ $y=3\left(-\frac{1}{2}\right)=-\frac{3}{2}$ $\left(-\frac{3\sqrt{3}}{2}-\frac{3}{2}i\right)$

b. $2\left(\cos\frac{\pi}{18}+i\sin\frac{\pi}{18}\right)$ $x=2\cos\frac{\pi}{18}$ $y=2\sin\frac{\pi}{18}$ $(1.97,.35i)$ $1.97+.35i$

c. $4\,\mathrm{cis}\left(\frac{7\pi}{4}\right)$ $x=4\cos\frac{7\pi}{4}$ $y=4\sin\frac{7\pi}{4}$ $4\cdot\frac{\sqrt{2}}{2}$ $4\cdot\frac{-\sqrt{2}}{2}$ $(2\sqrt{2},-2i\sqrt{2})$ $2\sqrt{2}-2\sqrt{2}i$

3. Convert the rectangular/polar coordinate into polar/rectangular coordinate:

a. $(3,3\sqrt{3})$ $\sqrt{3^2+3\sqrt{3}^2}=\sqrt{36}=6$ $\tan^{-1}\frac{3\sqrt{3}}{3}=\frac{\pi}{3}$ $6\,\mathrm{cis}\,\frac{\pi}{3}$

b. $(-2,2)$ $\sqrt{(-2)^2+(2)^2}=2\sqrt{2}$ $\tan^{-1}\frac{2}{-2}=-1=\frac{3\pi}{4}$ $2\sqrt{2}\,\mathrm{cis}\,\frac{3\pi}{4}$

c. $\left(4,\frac{2\pi}{3}\right)$ $x=4\cos\frac{2\pi}{3}$ $4\cdot\frac{-1}{2}=-2$ $y=4\sin\frac{2\pi}{3}$ $4\cdot\frac{\sqrt{3}}{2}=2\sqrt{3}$ $-2+2\sqrt{3}i$