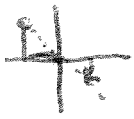
Name Mine Date

Math 112: #34 A/B/C/D

A) Convert

1. $\left(-1,-\frac{\pi}{6}\right)$ into exact rectangular coordinates.



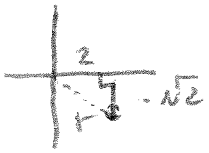
(r,θ) (x,y)

$x = r\cos\theta = -1\cdot\cos\left(-\frac{\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

$y = r\sin\theta = -1\cdot\sin\left(-\frac{\pi}{6}\right) = \frac{1}{2}$

$\left(-\frac{\sqrt{3}}{2},\frac{1}{2}\right)$

2. $(2,-\sqrt{2})$ into polar coordinates. (r,θ)



$r^2 = x^2+y^2 = (2)^2+(-\sqrt{2})^2 = 4+2 = 6$

$r = \sqrt{6}$

$\theta = \tan^{-1}\left(\frac{y}{x}\right) = \tan^{-1}\left(-\frac{\sqrt{2}}{2}\right) = -0.615$

$(\sqrt{6},-0.615)$

B) Convert

1. $\left(5,\frac{4\pi}{3}\right)$ into exact rectangular coordinates.

$x = 5\cos\frac{4\pi}{3} = 5\cdot-\frac{1}{2} = -2\frac{1}{2}$

$y = 5\sin\frac{4\pi}{3} = 5\cdot-\frac{\sqrt{3}}{2} = -\frac{5\sqrt{3}}{2}$

$\left(-2\frac{1}{2},-\frac{5\sqrt{3}}{2}\right)$

2. $(-1,\sqrt{3})$ into polar coordinates.

(x,y) to (r,θ)

$r^2 = (-1)^2+(\sqrt{3})^2 = 1+3 = 4$

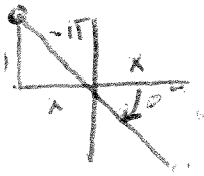
$r = 2$

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

$\left(2,-\frac{\pi}{3}\right)$

C) Convert

1. $\left(-\pi,-\frac{\pi}{4}\right)$ into exact rectangular coordinates.



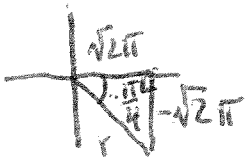
(r,θ) (x,y)

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

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

$\left(\frac{-\pi\sqrt{2}}{2}, \frac{\pi\sqrt{2}}{2}\right)$

2. $\left(\sqrt{2}\pi,-\sqrt{2}\pi\right)$ into polar coordinates.



x, y (r,θ)

$\theta = -\frac{\pi}{4}$

$r^2 = \left(\sqrt{2}\pi\right)^2 + \left(\sqrt{2}\pi\right)^2$

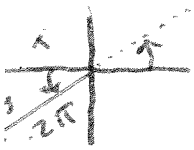
$r^2 = 2\pi^2 + 2\pi^2 = 4\pi^2$

$r = 2\pi$

$\left(2\pi, -\frac{\pi}{4}\right)$

D) Convert

1. $\left(-2\pi,\frac{\pi}{6}\right)$ into exact rectangular coordinates.



(r,θ) to (x,y)

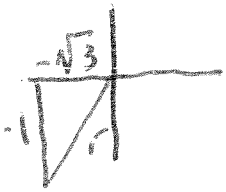
$x = -2\pi\cos\frac{\pi}{6} = -2\pi\cdot\frac{\sqrt{3}}{2} = -\sqrt{3}\pi$

$y = -2\pi\sin\frac{\pi}{6} = -2\pi\cdot\frac{1}{2} = -\pi$

$\left(-\sqrt{3}\pi, -\pi\right)$

2. $\left(-\sqrt{3},-1\right)$ into polar coordinates.

$(x,y) \rightarrow (r,\theta)$



$r^2 = \left(-\sqrt{3}\right)^2 + (-1)^2 = 3+1 = 4$

$r = 2$

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

but not ↗

so $\theta = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$

$\left(2, \frac{7\pi}{6}\right)$