Math 1211: Quiz #7 **Winter 2016**

Name: Key	A#:	Section:

1. Find the Cartesian (x, y) coordinates of the point with polar coordinates $(r, \theta) = (3, \frac{5\pi}{6})$.

$r = 3$, $\theta = \frac{5\pi}{6}$

$x = r\cos\theta$

$x = 3\cos\frac{5\pi}{6}$

$= 3\left(-\sqrt{3}/2\right)$

$= -\frac{3\sqrt{3}}{2}$

$y = r\sin\theta$

$y = 3\sin\frac{5\pi}{6}$

$= 3(1/2)$

$= \frac{3}{2}$

$\cos\frac{5\pi}{6} = \frac{-\sqrt{3}}{2}$

$\sin\frac{5\pi}{6} = \frac{1}{2}$

$\therefore (x, y) = \left(-\frac{3\sqrt{3}}{2}, \frac{3}{2}\right)$

2. Give **three distinct pairs** of polar coordinates for the point $(x, y) = (-2, -2)$.

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

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

$= \sqrt{4+4}$

$= \sqrt{8}$

$= 2\sqrt{2}$

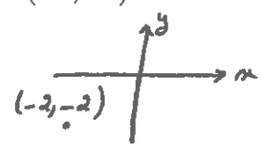
$\tan\theta = \frac{y}{x}$

$\theta = \tan^{-1}(y/x)$

$\theta = \tan^{-1}\left(\frac{-2}{-2}\right) = \tan^{-1}(1) = \pi/4$

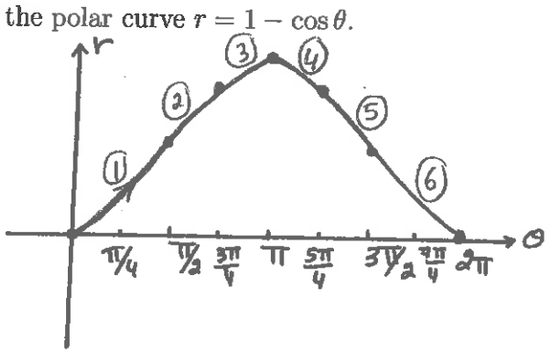
$\therefore (r, \theta) = (2\sqrt{2}, 5\pi/4)$

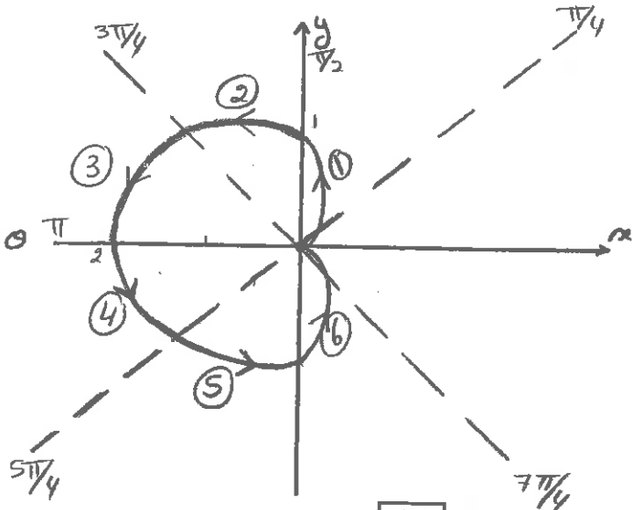
and $(2\sqrt{2}, \frac{13\pi}{4})$ and $(2\sqrt{2}, \frac{21\pi}{4})$



3. Sketch the polar curve $r = 1 - \cos\theta$.

θ	r
0	0
$\pi/2$	1
$3\pi/4$	$2 + \sqrt{2}/2 = 1.7$
π	2
$5\pi/4$	1.7
$3\pi/2$	1
$7\pi/4$	0.3
2π	0





v7.2

Math 1211: Quiz #7 **Winter 2016**

Name: Key	A#:	Section:

1. Find the Cartesian (x, y) coordinates of the point with polar coordinates $(r, \theta) = (4, \frac{2\pi}{3})$.

$r = 4$, $\theta = \frac{2\pi}{3}$

$x = r\cos\theta$
$x = 4\cos\frac{2\pi}{3}$
$= 4(-1/2)$
$= -2$

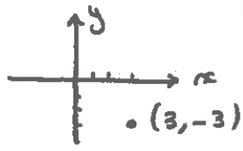
$y = r\sin\theta$
$y = 4\sin\frac{2\pi}{3}$
$= 4 \cdot \frac{\sqrt{3}}{2}$
$= 2\sqrt{3}$

$\therefore (x, y) = (-2, 2\sqrt{3})$

2. Give **three distinct pairs** of polar coordinates for the point $(x, y) = (3, -3)$.

$r = \sqrt{x^2 + y^2}$
$r = \sqrt{(3)^2 + (-3)^2}$
$= \sqrt{9+9}$
$= \sqrt{18} = 3\sqrt{2}$

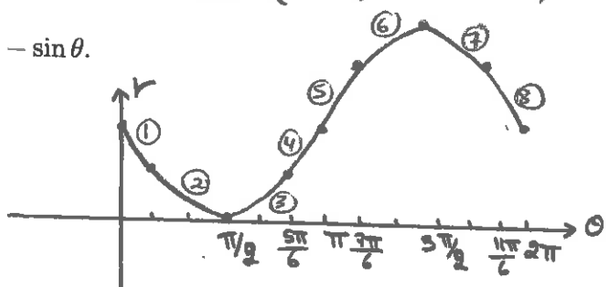
$\tan\theta = \frac{y}{x}$
$\theta = \tan^{-1}(y/x)$
$\theta = \tan^{-1}\left(\frac{-3}{3}\right) = \tan^{-1}(-1) = -\pi/4$
$\therefore (r, \theta) = (3\sqrt{2}, -\pi/4)$
and $(3\sqrt{3}, 2\pi - \pi/4)$

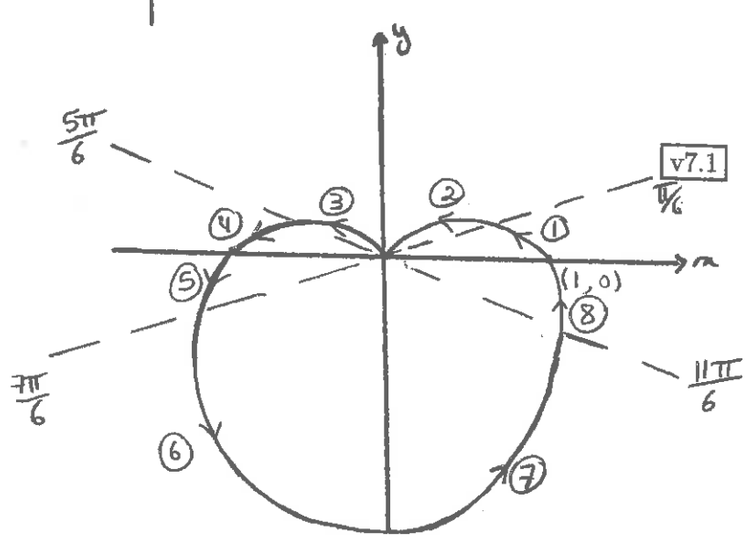


3. Sketch the polar curve $r = 1 - \sin\theta$.

$r = 1 - \sin\theta$
$1 - \sin\theta = 0$
$-\sin\theta = -1$
$\sin\theta = 1$
no $\theta = \frac{\pi}{2}$

θ	$r = 1 - \sin\theta$
0	1
$\pi/6$	$1/2$
$\pi/2$	0
$5\pi/6$	$1/2$
π	1
$\frac{3\pi}{6}$	$3/2$
$\frac{3\pi}{2}$	2
$\frac{11\pi}{6}$	$3/2$
2π	1





v7.1

Math 1211: Quiz #7 **Winter 2016**

Name: SOLUTIONS	A#:	Section:

1. Find the Cartesian (x, y) coordinates of the point with polar coordinates $(r, \theta) = (2, \frac{5\pi}{4})$.

$x = r\cos\theta = 2\cos\left(\frac{5\pi}{4}\right) = 2\left(-\frac{1}{\sqrt{2}}\right) = -\sqrt{2}$

$y = r\sin\theta = 2\sin\left(\frac{5\pi}{4}\right) = 2\left(-\frac{1}{\sqrt{2}}\right) = -\sqrt{2}$

So $\boxed{(x, y) = (-\sqrt{2}, -\sqrt{2})}$

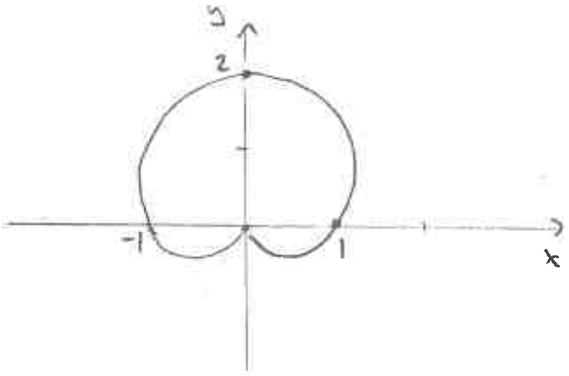
2. Give **three distinct pairs** of polar coordinates for the point $(x, y) = (1, -\sqrt{3})$.

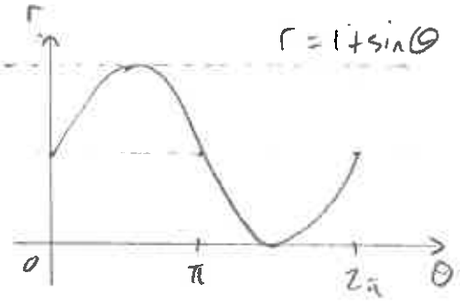
$r = \sqrt{x^2 + y^2} = \sqrt{1+3} = 2$

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

So $\boxed{(r, \theta) = \left(2, -\frac{\pi}{3}\right) \text{ OR } \left(2, \frac{5\pi}{3}\right) \text{ OR } \left(-2, \frac{2\pi}{3}\right)}$ etc

3. Sketch the polar curve $r = 1 + \sin\theta$.





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