MATH 152
Mrs. Bonny Tighe

QUIZ 11
25 points
11.3

NAME Answers

Section_____Wed 12/7/05

1. Find the Cartesian coordinates for the polar coordinate

a) $(2, 7\pi/4)$ $(\sqrt{2}, -\sqrt{2})$

$x = r\cos\theta = 2(\sqrt{2}/2)$

$y = r\sin\theta = 2(-\sqrt{2}/2)$

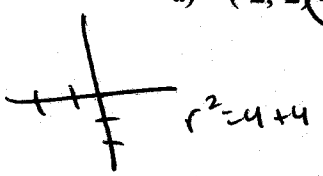
b) $(-3, -2\pi/3) =$ $(3/2, 3\sqrt{3}/2)$

$x = -3\cos(-2\pi/3) = -3(-1/2)$

$y = -3\sin(-2\pi/3) = -3(-\sqrt{3}/2)$

and **two different Polar** coordinates for the points:

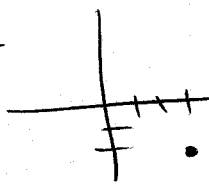
a) $(-2,-2)$ $(2\sqrt{2}, 5\pi/4)$ and $(2\sqrt{2}, -3\pi/4)$ or $(-2\sqrt{2}, \pi/4)$



b) $(3, -2)$ _____ and _____

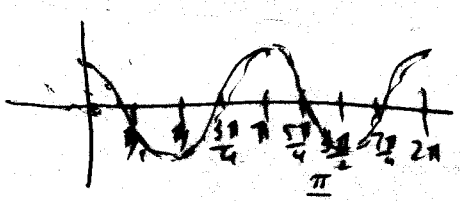
$(\sqrt{13}, \tan^{-1}(-2/3))$

$(-\sqrt{13}, \tan^{-1}(-2/3)+\pi)$

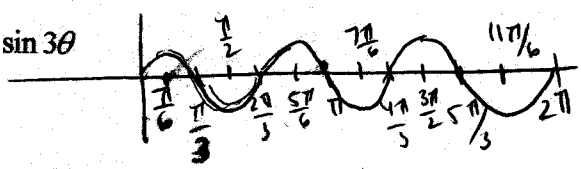


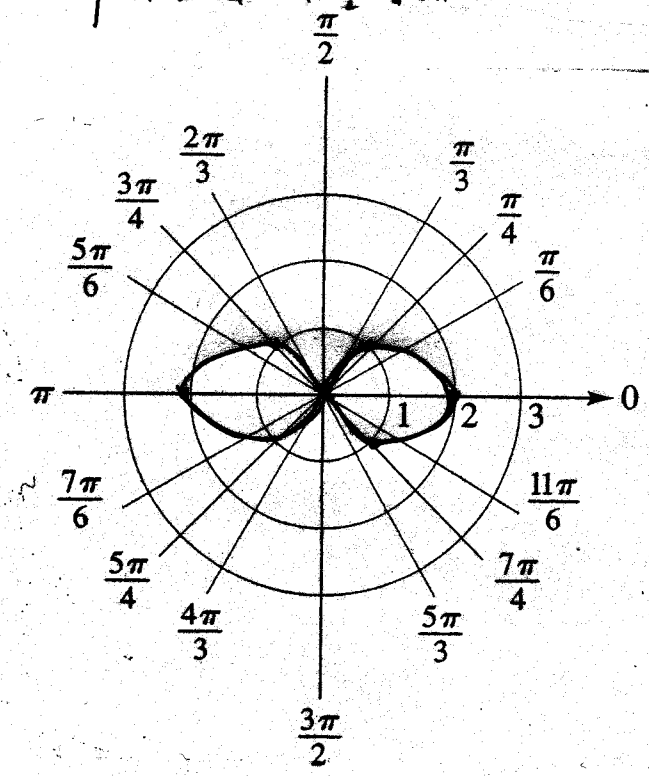
2. Sketch the curve with the given polar equation.

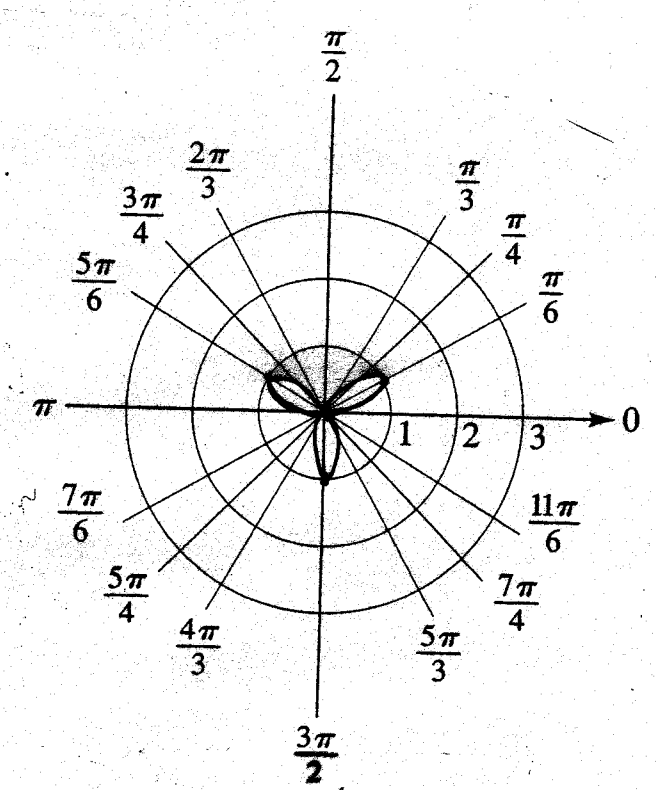
a) $r = 1+\cos 2\theta$



b) $r = \sin 3\theta$







$dr/d\theta = 2\cos\theta$

3. Find the slope of the tangent line to the curve $r = \sin 2\theta$ *at* $\theta = \pi/6$

$$\frac{dy}{dx} = \frac{\frac{dr}{d\theta}\sin\theta + r\cos\theta}{\frac{dr}{d\theta}\cos\theta - r\sin\theta} = \frac{2\cos\theta\sin\theta + \sin 2\theta(\cos\theta)}{2\cos\theta\cos\theta - 2\sin 2\theta(\sin\theta)}$$

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

4. Find the points on the curve $r = e^\theta$ where the tangent line is horizontal or vertical.

$dr/d\theta = e^\theta$

$$\frac{dy}{dx} = \frac{e^\theta\sin\theta + e^\theta\cos\theta}{e^\theta\cos\theta - e^\theta\sin\theta}$$

Horizontal: $= 0$

$e^\theta(\sin\theta + \cos\theta) = 0$

$\sin\theta = -\cos\theta$

$\tan\theta = -1$

$\theta = 3\pi/4 + \pi k$

Vertical: $= 0$

$e^\theta(\cos\theta - \sin\theta) = 0$

$\cos\theta = \sin\theta$

$1 = \tan\theta$

$\theta = \pi/4 + \pi k$

5. Find a polar equation for the curve represented by the Cartesian equation $x + y = 3$.

$r\cos\theta + r\sin\theta = 3$

$$r = \frac{3}{\cos\theta + \sin\theta}$$

6. Find the distance between the two points with polar coordinates $(2, \pi/6)$ *and* $(1, 3\pi/4)$.

$$d^2 = r_1^2 + r_2^2 - 2r_1r_2\cos(\theta_2 - \theta_1)$$

$$d^2 = 2^2 + 1^2 - 2(2)(1)\cos(3\pi/4 - \pi/6)$$

$$= 4 + 1 - 4(\cos 7\pi/12)$$

$$= 5 - 4\cos 7\pi/12$$

$$d = \sqrt{5 - 4\cos 7\pi/12}$$

$\frac{3\pi}{4} = \frac{9\pi}{12}$

$-\frac{\pi}{6} = \frac{-2\pi}{12}$