MAT 192, Quiz #7, Fall 2016 Name KEY

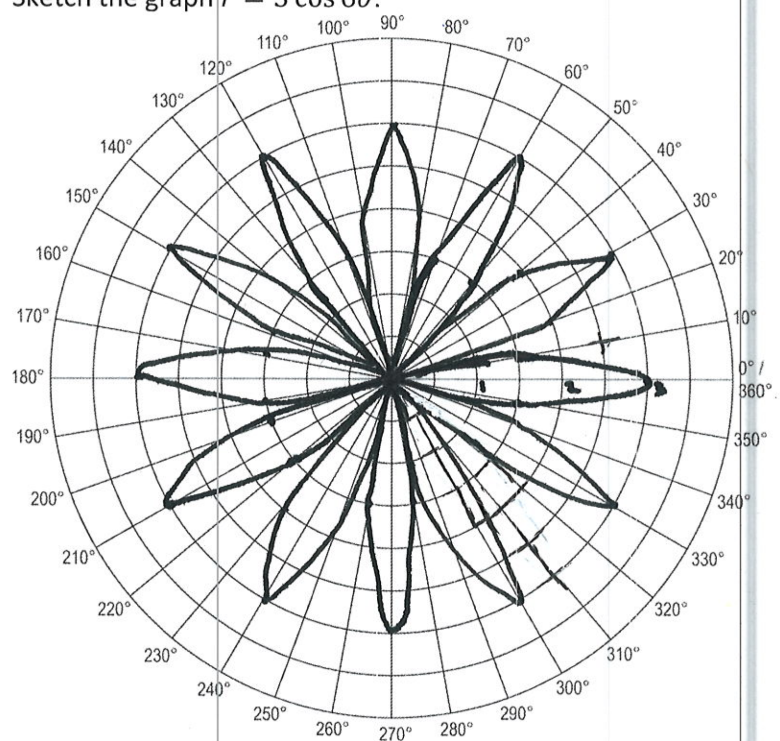
Instructions: Show all work. Answers without work required to obtain the solution will not receive full credit. Some questions may contain multiple parts: be sure to answer all of them. Give exact answers unless specifically asked to estimate.

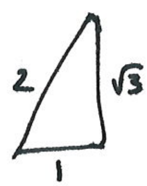
1. Find an equation of the tangent line to the curve $x = 1 + \sqrt{t}$, $y = e^{t^2}$ at $(2, e)$.

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{2te^{t^2}}{\frac{1}{2}t^{-1/2}} = \frac{2(1)e^{(1)^2}}{\frac{1}{2}(1)^{-1/2}} = \frac{2e}{\frac{1}{2}} = 4e \quad @t=1$$

tangent line : $y - e = 4e(x-2)$

2. Sketch the graph $r = 3\cos 6\theta$.





θ	r
10°	$3(1/2) = 1.5$
0°	$3(1)$
20°	-1.5
30°	-3
40°	-1.5
50°	1.5

etc.

3. Find the area of one loop of $r = 3\cos 6\theta$.

$0 = 3\cos 6\theta$ $\qquad$ $0 = 3\cos\beta$

$\cos\beta = 0$ when $\beta = \pi/2, -\pi/2$

$\pm\frac{\pi}{2} = 6\theta \Rightarrow \frac{\pm\pi}{12} = \theta$

$$\frac{1}{2}\int_{-\pi/12}^{\pi/12} (3\cos 6\theta)^2\, d\theta = \frac{9}{2}\cdot\frac{1}{2}\int_{-\pi/12}^{\pi/12} 1 + \cos 12\theta\, d\theta = \frac{9}{2}\int_{0}^{\pi/12} 1 + \cos 12\theta\, d\theta$$

even

$$\frac{9}{2}\left[\theta + \frac{1}{12}\sin 12\theta\right|_0^{\pi/12} = \frac{9}{2}\left[\pi/12 + 0\right] = \frac{9\pi}{24}$$

4. Identify the type of conic.

a. $3x^2 + 8y = 0$

parabola

b. $x^2 + y^2 + 2x - 4y + 4 = 0$

circle

c. $y^2 - 16x^2 = 16$

hyperbola

d. $x^2 + 9y^2 = 9$

ellipse