10.1,10.2,10.3,10.5: Recap

Monday, January 25

♣ Evaluate:

1. $\sin(5\pi/6) =$
2. $\cos(5\pi/4) =$
3. $\cos(2\pi/3) =$
4. $\sin(-12\pi) =$
5. $\cos(-\pi/6) =$
6. $\tan(\pi/4) =$
7. $\frac{d}{d\theta} \sin\theta/\theta =$
8. $\frac{d}{dx} 2\sin(x^2)\cos(x^2) =$
9. $\frac{d}{dt} e^t(\sin^2 t + \cos^2 t) =$

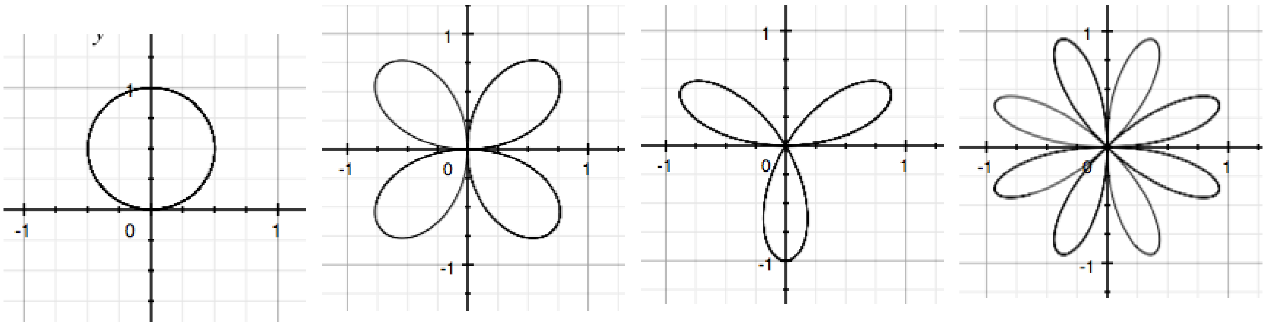
Find Cartesian and parametric equations that describe each of the following:

1. An ellipse centered at $(3, -1)$ with semiaxes of length 2 and 5
2. A parabola opening upward that hits its minimum at $(2, 0)$
3. A hyperbola opening horizontally.

♡ Describe the path the particle takes, and sketch. Find all points (in time and space) where the line tangent to the curve has slope 1.

1. $x = -3\cos t$, $y = 2\sin t$, $\pi/2 \le t \le 3\pi/2$
2. $x = \sin 2t$, $y = 1 - \cos^2 2t$, $0 \le t \le 2\pi$
3. $x = t^2 - 1$, $y = t^2 - 1$, $-\infty < t < \infty$

◇ Below are graphs of the polar equations $r = \sin\theta$, $r = \sin 2\theta$, $r = \sin 3\theta$, and $r = \sin 4\theta$. Explain. What does the path of the particle look like?



What do you think the graphs of $r = \cos\theta$, $r = \cos 2\theta, r = \cos 3\theta, r = \cos 4\theta$ look like?

♠ True or False? Explain your reasoning.

1. The curve defined by any set of parametric equations $(x, y) = (f(t), g(t))$ can also be defined by an equation of the form $y = h(x)$.
2. The curve defined by any equation of the form $y = h(x)$ can also be defined by a set of parametric equations $(x, y) = (f(t), g(t))$.
3. If $dy/dt = 0$ at some point on a curve then the tangent line at that point is horizontal.
4. If a circle is parametrized as $(x, y) = (\cos t, \sin t)$, then for any t the angle between $(x(t), y(t))$ and the positive x-axis will be equal to t.
5. If $f(\theta) = f(-\theta)$ for all θ, then the curve defined by $r = f(\theta)$ will have a vertical axis of symmetry.
6. If $f(\theta) = f(\theta + \pi)$ for all θ, then the curve defined by $r = f(\theta)$ will be unchanged when it is rotated by 180 degrees about the origin.