Math2210 Quiz 1 (Sections 10.4, 11.1) Summer, 2010 Dylan Zwick

Name Solutions Date 7/13/10

Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

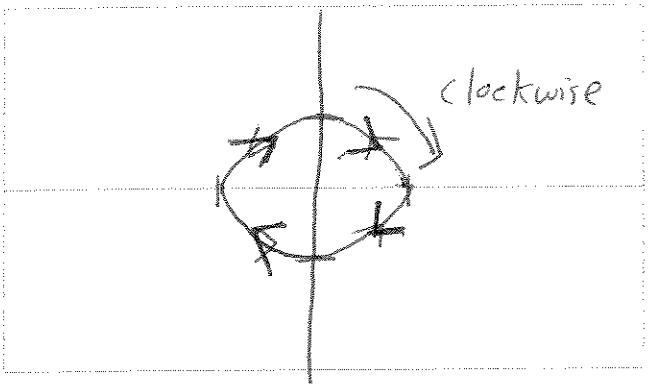
1. For $x=\sin 2t$ and $y=\cos 2t$ such that $0\le t\le \pi$, eliminate the parameter and graph the curve. Indicate if the curve is simple and/or closed.

   Hint: $x^2+y^2=?$

$$x^2+y^2=\sin^2 2t+\cos^2 2t=1$$

$\Rightarrow$ Unit circle.

Simple and closed.



Simple: (T) or F (circle one)

Closed: (T) or F (circle one)

2. Find the distance between the points (1, 3, 5) and (3, 3, 3).

$$d=\sqrt{(3-1)^2+(3-3)^2+(3-5)^2}$$

$$=\sqrt{2^2+0^2+(-2)^2}=\sqrt{8}=2\sqrt{2}$$

distance = $2\sqrt{2}$

3. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ (without eliminating the parameter) for $x=4t^3+2t^2$ and $y=3t^4$ such that $t\neq 0$.

$$\frac{dy}{dx}=\frac{dy/dt}{dx/dt}=\frac{12t^3}{12t^2+4t}=\boxed{\frac{3t^2}{3t+1}}$$

$$\frac{d^2y}{dx^2}=\frac{dy'}{dx}=\frac{dy'/dt}{dx/dt}=\frac{(3t+1)(6t)-3t^2(3)}{(3t+1)^2}\Big/\,4t(3t+1)$$

$$=\frac{9t^2+6t}{4t(3t+1)^3}=\boxed{\frac{9t+6}{4(3t+1)^3}}$$

$\frac{dy}{dx}=$ $\frac{3t^2}{3t+1}$

$\frac{d^2y}{dx^2}=$ $\frac{9t+6}{4(3t+1)^3}$

4. Find the equation of the sphere that has the line segment joining the two points in question #2 as a diameter.

$$\text{Center}=\left(\frac{1+3}{2},\frac{3+3}{2},\frac{5+3}{2}\right)=(2,3,4)$$

$$\text{Radius}=\frac{2\sqrt{2}}{2}=\sqrt{2}$$

$$\Rightarrow (x-2)^2+(y-3)^2+(z-4)^2=(\sqrt{2})^2$$

Center of sphere: $(2,3,4)$

Equation of sphere: $(x-2)^2+(y-3)^2+(z-4)^2=2$