Math2210 Quiz 1 (Sections 10.4, 11.1) Summer, 2012   Dylan Zwick

Name _____Key_____ Date __7-10-2012__

<u>Instructions</u>: 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 $x = 4 - t$ and $y = \sqrt{t}$ such that $0 \le t \le 4$, eliminate the parameter and graph the curve. Indicate if the curve is simple and/or closed.

$$y = \sqrt{t} \Rightarrow y^2 = t$$
$$x = 4 - y^2$$
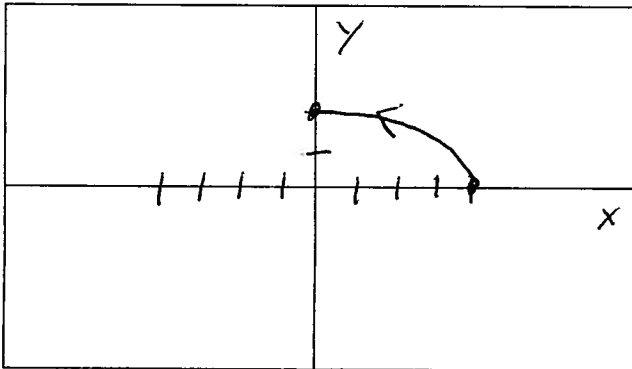
Equation ___$x = 4 - y^2$_____

Simple: (T) or F (circle one)

Closed: T or (F) (circle one)

2. Find the distance between the points (0, 1, 2) and (4, 3, 6).

$$D = \sqrt{(4-0)^2 + (3-1)^2 + (6-2)^2}$$
$$= \sqrt{16 + 4 + 16} = \sqrt{36}$$
$$= 6$$

distance = __6__

3. Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ (without eliminating the parameter) for

$x=3t^2+2t+1$ and $y=2t^3+4t^2+7$.

$\dfrac{dy}{dt} = 6t^2+8t$

$\dfrac{dx}{dt} = 6t+2$

$\dfrac{dy}{dx} = \dfrac{\frac{dy}{dt}}{\frac{dx}{dt}} = \dfrac{6t^2+8t}{6t+2} = \boxed{\dfrac{3t^2+4t}{3t+1}}$

$\dfrac{d^2y}{dx^2} = \dfrac{\frac{dy'}{dt}}{\frac{dx}{dt}}$

$\dfrac{dy'}{dt} = \dfrac{(3t+1)(6t+4)-(3t^2+4t)3}{(3t+1)^2}$

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

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

$\dfrac{dy}{dx} = \dfrac{3t^2+4t}{3t+1}$

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

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

$\text{Center} = \left(\dfrac{4+0}{2}, \dfrac{1+3}{2}, \dfrac{2+6}{2} \right) = (2, 2, 4)$

$\text{Radius} = \dfrac{6}{2} = 3$

$\Rightarrow$ Equation : $3^2 = (x-2)^2 + (y-2)^2 + (z-4)^2$

$\Rightarrow 9 = (x-2)^2 + (y-2)^2 + (z-4)^2$

Center of sphere: $\underline{(2, 2, 4)}$

Equation of sphere: $\underline{9 = (x-2)^2 + (y-2)^2 + (z-4)^2}$