Math 172 | Quiz 13 | Name: _____

Due: 2 Dec 2016 | Show Appropriate Work | Point Values in boxes.

1. [2] Find parametric equations $x(t)$ and $y(t)$ for the line segment from $(2,3)$ to $(0,6)$, include the domain of t.

$x = 2 - 2t$

$y = 3 + 3t$ $\qquad 0 \le t \le 1$

2. [2] Find parametric equations $x(t)$ and $y(t)$ for the circle of radius 2 centered at $(1,3)$, include the domain of t.

$x = 1 + 2\cos t$

$y = 3 + 2\sin t$ $\qquad 0 \le t \le 2\pi$

3. [2] Let $c(t) = (\sin t, t)$.

(a) Find the slope, dy/dx, at $t = \pi$.

$$\frac{dy}{dx} = \frac{1}{\cos t} \quad \text{so} \quad \left.\frac{dy}{dx}\right|_{t=\pi} = \frac{1}{-1} = -1$$

(b) Find the speed, ds/dt, at $t = \pi$.

$$\frac{ds}{dt} = \sqrt{1 + \cos^2 t} \quad \text{so} \quad \left.\frac{ds}{dt}\right|_{t=\pi} = \sqrt{1+1} = \sqrt{2}$$

4. [4] Find the length of the curve $c(t) = (t^3 - 3t, 12 - 3t^2)$ for $0 \le t \le 1$.

$x' = 3t^2 - 3$

$y' = -6t$

so $\quad (x')^2 + (y')^2 = 9t^4 - 18t^2 + 9 + 36t^2 = 9t^4 + 18t^2 + 9 = 9(t^2+1)^2$

$$ds = 3(t^2+1)\,dt$$

$$S = \int_0^1 3(t^2+1)\,dt = t^3 + 3t \Big|_0^1 = 4$$