Math 172 | Quiz 13 | Name: _____

22 April 2016 | Show Appropriate Work | Point Values in boxes.

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

$x = 1 + t$

$y = 2 - 2t$

$0 \le t \le 1$

2. [2] Find parametric equations, $x(t)$ and $y(t)$, for the circle with center $(1, -2)$ and radius 3. Include the domain of t.

$x = 1 + 3\cos t$

$y = -2 + 3\sin t$

$0 \le t \le 2\pi$

3. [2] Find all points, (x, y) coordinates, where $c(t) = (t^2 + t - 1, t^3 + 3t^2 - 3t)$ has slope 6.

$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{3t^2 + 6t - 3}{2t + 1} = 6$ so $3t^2 + 6t - 3 = 12t + 6$

$3t^2 - 6t - 9 = 0$

$t^2 - 2t - 3 = 0$

$(t - 3)(t + 1) = 0$

$t = 3, \; t = -1$

$c(3) = (11, 45)$

$c(-1) = (-1, 5)$

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

$x' = 3t^2 - 3$

$y' = -6t$

$(x')^2 + (y')^2 = (3t^2 - 3)^2 + (-6t)^2 = 9t^4 - 18t^2 + 9 + 36t^2$

$= 9t^4 + 18t^2 + 9 = 9(t^2 + 1)^2$

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

$$S = \int_0^1 3(t^2 + 1)\,dt = 3\left(\frac{t^3}{3} + t\right)\Big|_0^1 = 3\left(\frac{1}{3} + 1\right) = 4$$