MATH 251: Quiz 3

October 8, 2015

Name: _____ Sec: _____

1. Let $\vec{r}(t) = \langle 4t, \cos(3t), \sin(3t) \rangle$.

   (a) Find the length of $\vec{r}(t)$ between $t = 0$ and $t = 2$.

   (b) Compute the curvature of $\vec{r}$ at $t = 1$.

Curvature Formulas:

$$\kappa(t) = \left\|\frac{d\vec{T}}{ds}\right\| \qquad \kappa(t) = \frac{||\vec{r'}(t) \times \vec{r''}(t)||}{||\vec{r'}(t)||^3} \qquad \kappa(x) = \frac{|f''(x)|}{(1 + f'(x)^2)^{3/2}}$$

2. Compute f_{xx}, f_{xy}, and f_{yy} for $f(x,y) = x^3 + 3x^2y + 4y^2\sin(x)$.

3. Explain why

$$g(x,y) = \frac{x^2 + ye^{x^2}}{x^2 + y^2 + 1}$$

is continuous at $(x,y) = (1,2)$. [Hint: Use the form of this function, and that functions you know from Calculus I are continuous.] Use this to compute

$$\lim_{(x,y)\to(1,2)} g(x,y).$$