

Name: _____

MA 3330: Quiz 5

1. Define $\mathbf{r}(t) = \langle t^2, 2t \rangle$.
 - (a) Graph the $\mathbf{r}(t)$.
 - (b) Compute $\mathbf{v}(t) = \mathbf{r}'(t)$. and $\mathbf{a}(t) = \mathbf{r}''(t)$. Recall the first derivative is velocity and the second derivative is acceleration.
 - (c) Compute $\mathbf{r}(1)$, $\mathbf{v}(1)$ and $\mathbf{a}(1)$. Graph the vectors $\mathbf{v}(1)$ and $\mathbf{a}(1)$ starting with initial point $\mathbf{r}(1)$.
2. Define $\mathbf{r}(t) = \langle 5 \sin(2t), 4 \cos(2t), 3 \cos(2t) \rangle$.
 - (a) Compute $\mathbf{r}'(t)$ and simplify. This quantity is the velocity.
 - (b) Compute $\|\mathbf{r}'(t)\|$ and simplify. This quantity is the speed. How is this different than the velocity?
 - (c) Compute $\int_0^\pi \|\mathbf{r}'(t)\| dt$.
 - (d) Compute the arclength from $t = 0$ to $t = \pi$.
3. Compute the limits or show the limit does not exist.
 - (a) $\lim_{(x,y) \rightarrow (0,0)} \frac{1 - \cos(x^2 + y^2)}{(x^2 + y^2)^2}$
 - (b) $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 - 3xy + y^2}{x^2 + y^2}$
4. Graph the contour plot for
 - (a) $f(x, y) = x^2 + y$ for $z = -1, 0, 1, 2, 3$
 - (b) $f(x, y) = x^2 - y^2$ for $z = -1, 0, 1, 2, 3$ Remember this is that saddle.