

Math 114 HW 3

due Thursday, 6/2

1. (Spring 2013) Find the curvature for $\vec{r}(t) = \langle -t, -\ln(\cos t), 0 \rangle$ at $t = \frac{\pi}{4}$.
2. (Fall 2013) Find $|\vec{r}(1)|$ if $|\vec{r}(0)| = 0$ and $\vec{r}(t) \cdot \vec{r}'(t) = 6t^2$ for all t .
3. (Fall 2012) TRUE or FALSE. For each of the following statements, indicate whether it is true or false. Support your answers.

(a) The function $g(x, y) = \begin{cases} \frac{x^3+y^3}{x+y} & \text{if } x \neq -y \\ 0 & \text{if } x = -y \end{cases}$ is continuous.

(b) The curvature of the curve $\langle 4t, \cos(2t), \sin(2t) \rangle$ is constant.

4. (Fall 2011) Which of the following limits exist?

(a) $\lim_{(x,y) \rightarrow (0,0)} \frac{x^4 - y^4}{x^2 - y^2}$

(b) $\lim_{(x,y) \rightarrow (0,0)} \frac{x - y}{x^2 + y^2}$

(c) $\lim_{(x,y) \rightarrow (0,0)} \frac{x + y}{\sqrt{x^2 + y^2}}$

5. (Fall 2012) What is the limit $\lim_{(x,y) \rightarrow (0,0)} \frac{(x^2 + y^2) \sin(x^2 + y^2)}{x^4 + y^4}$? Explain your answer.

(a) 2 (b) 1 (c) 3 (d) 0 (e) Does not exist (f) 6 (g) $\frac{9}{4}$ (h) 9