

Math 173 - Quiz 6

March 1, 2018

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Find the curvature of the graph of $y = \cos 10x$ at the point where $x = 0$.

$$y' = -10 \sin 10x$$

$$y'' = -100 \cos 10x$$

$$K = \frac{|-100 \cos 10x|}{(1 + 100 \sin^2 10x)^{3/2}}$$

$$K|_{x=0} = 100$$

2. (3 points) Consider the function $h(x, y) = \sqrt{1 + y - x^2}$.

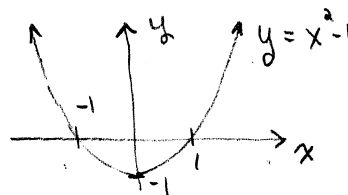
- (a) What is the domain of h ?

MUST HAVE $1 + y - x^2 \geq 0$ OR $y \geq x^2 - 1$

$$\{(x, y) : y \geq x^2 - 1\}$$

- (b) Sketch the level curve $h(x, y) = 0$.

$$1 + y - x^2 = 0 \Rightarrow y = x^2 - 1$$



- (c) The graph of h is one-half of one of the quadric surfaces that we are familiar with. Describe the graph of h .

$$z^2 = 1 + y - x^2$$

$$y = x^2 + z^2 - 1$$

THIS DESCRIBES A PARABOLOID.

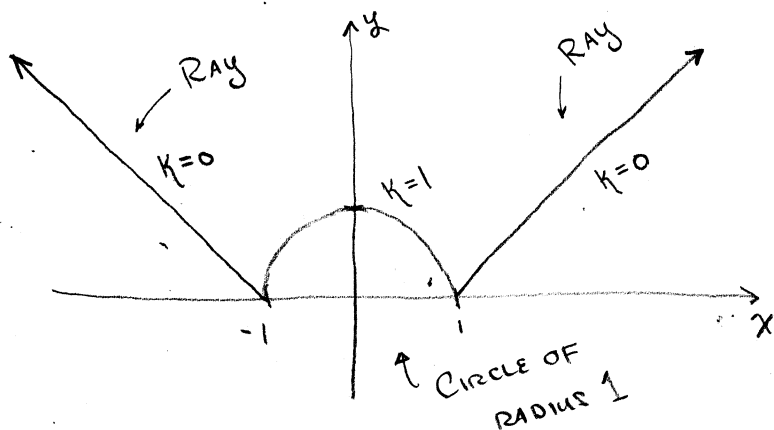
THE GRAPH OF h IS THE UPPER HALF.

3. (2 points) If a car's speedometer is constant, which component of the acceleration is necessarily zero, the tangential component (a_T) or the normal component (a_N)? Explain.

$$\text{SPEED CONSTANT} \Rightarrow a_T = 0$$

CAR MAY BE CHANGING DIRECTION, BUT NOT CHANGING SPEED.

4. (2 points) Sketch a curve that has at least one point at which the curvature is 1 and at least one point at which the curvature is 0. Identify and label such points.



CURVATURE = 1 AT ALL POINTS ON A CIRCLE OF RADIUS 1

CURVATURE = 0 AT ALL POINTS ON A LINE.