

Math 171 - Quiz 6

October 3, 2018

Name key

Score _____

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

1. (5 points) Determine each derivative.

$$(a) \frac{d}{dx} (x^{2/3} \tan x) = x^{2/3} \sec^2 x + \frac{2}{3} x^{-1/3} \tan x$$

$$(b) \frac{d}{dt} \left(5t^3 + \frac{6}{t^3} - 8 \cos t \right) = \frac{d}{dt} (5t^3 + 6t^{-3} - 8 \cos t)$$

$$= 15t^2 - 18t^{-4} + 8 \sin t$$

$$= 15t^2 - \frac{18}{t^4} + 8 \sin t$$

2. (3 points) Find an equation of the line tangent to the graph of $y = \frac{\sqrt{x}}{x^2 - 2x}$ at the point where $x = 4$.

$$x = 4 \Rightarrow y = \frac{2}{16 - 8} = \frac{1}{4} \Rightarrow \text{Point: } (4, \frac{1}{4})$$

$$\frac{dy}{dx} = \frac{(x^2 - 2x)(\frac{1}{2}x^{-1/2}) - \sqrt{x}(2x - 2)}{(x^2 - 2x)^2}$$

$$m = \frac{dy}{dx} \Big|_{x=4} = \frac{(16-8)(1/4) - (2)(8-2)}{(16-8)^2} = \frac{-10}{64} = -\frac{5}{32}$$

TAN LINE: SEE ATTACHED GRAPH.

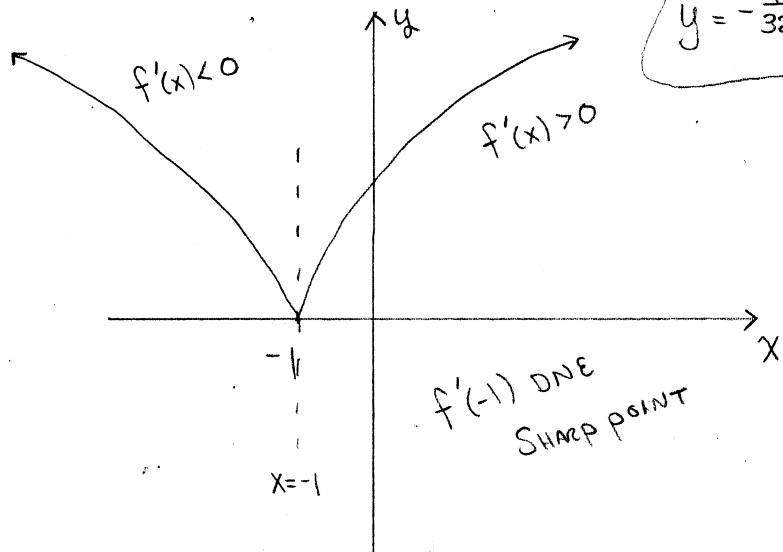
$$y - \frac{1}{4} = -\frac{5}{32}(x - 4)$$

or

$$y = -\frac{1}{32}x + \frac{7}{8}$$

3. (2 points) Sketch the graph of a continuous function f that satisfies the following conditions:

- $f'(x) < 0$ for $x < -1$,
- $f'(x) > 0$ for $x > -1$, and
- $f'(-1)$ is not defined.



Graph of function and tangent line

