NAME: SOLUTION

MTH 132, MSU, 10/19/2018.

Quiz 6

1. [5 pts.] Find the critical numbers of the function:

$$f(x) = \frac{2x}{8x^2+9}.$$

$$f'(x) = \frac{2\cdot(8x^2+9) - 2x\cdot 16x}{(8x^2+9)^2} = \frac{-16x^2+18}{(8x^2+9)^2}$$

$f'(x)$ is well defined for all $x \in \mathbb{R}$.

- $f'(x) = 0 \iff -16x^2+18 = 0$
$\iff 16x^2 = 18$
$\iff x^2 = \frac{9}{8}$

The solutions are $x = \pm\frac{3}{2\sqrt{2}} = \pm\frac{3\sqrt{2}}{4}$

$\Rightarrow$ **Critical numbers: $-\frac{3\sqrt{2}}{4}, \frac{3\sqrt{2}}{4}$**

2. [5 pts.] Find the critical numbers of the function:

$$f(x) = 5x^{2/3} + 9x^{5/3}.$$

$$f'(x) = \frac{10}{3}x^{-\frac{1}{3}} + \frac{45}{3}x^{\frac{2}{3}} = \frac{1}{3}x^{-\frac{1}{3}}(10+45x) = \frac{10+45x}{3\sqrt[3]{x}}$$

- $f'(x) = 0 \iff 10x+45 = 0$
$\iff x = -\frac{10}{45} = -\frac{2}{9}$

- $f'(x)$ is not well defined for $x=0$ (which is in the domain)

$\Rightarrow$ **Critical numbers: $0, -\frac{2}{9}$**