

Name: _____

Date: Nov 5

Math 1

Quiz 5

Instructions: This quiz is closed book. You may not use notes, computing devices (calculators, computers, cell phones, etc.) or any other external resource. However, you may ask the instructor for clarification on problems. Please present your work neatly and clearly, **justify** your answers completely, and **box your answers**, when appropriate.

Problem 1. Find the derivative of following functions

1. $f(x) = \frac{x^2}{\sin x}$, using the quotient rule.

2. $f(x) = x^2 \tan(x) \sin(x)$, using the product rule.

Problem 2. Use the limit definition of derivative to show that the derivative does not exist at $x = 1$ for

$$f(x) = \begin{cases} 1, & x < 1 \\ x, & x \geq 1 \end{cases}$$

Problem 3. Let $f(x) = \frac{1}{\sqrt{x}}$. Use the limit definition of the derivative function to find $f'(x)$.

Problem 4. For the following graph,

- determine for which values of $x = a$ the $\lim_{x \rightarrow a} f(x)$ exists but f is not continuous at $x = a$, and
- determine which values of $x = a$ the function is continuous but not differentiable at $x = a$.

