

Quiz IV

Name: _____

Date: _____

This quiz is due by 11:59 pm Thursday, July 8. Your solutions to the following problems should be complete, given in the order they are stated, and uploaded to Canvas as a single document in PDF format.

1. (2 points) By using the *definition* of the derivative function ($f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$), find the derivative of $f(x) = \frac{2}{3-5x}$.
2. (2 points) By using the *definition* of the derivative at a point a ($f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$), compute the derivative of the greatest integer function $f(x) = [x]$ at $a = 3/2$. Show that this function fails to be differentiable at the point $a = 1$.
3. (2 points) Let $f(x) = \begin{cases} 3x^2 + 4x & \text{if } x \leq 1 \\ 2x^3 + bx + c & \text{if } x > 1 \end{cases}$ Find the values of b and c for which f is continuous and differentiable at $x = 1$.
4. (2 points) Compute the derivative $f'(x)$ of the function $f(x) = \cos x + 2e^x - 7x^3$ and find $f'(\pi)$.
5. (2 points) Find the equation of the tangent line (in slope intercept form) to the curve $y = e^x - \sin x$ at the point $(0, 1)$.
6. (Bonus, 2 points) Let $f(x) = \begin{cases} 4x & \text{if } x \leq 0 \\ ax^2 + bx + c & \text{if } 0 < x \leq 1 \\ 3 - 2x & \text{if } x > 1 \end{cases}$.

Determine the values of a , b , and c for which f is continuous and differentiable on \mathbb{R} .