Name: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯   ⎯⎯⎯⎯⎯⎯⎯⎯⎯ / 25

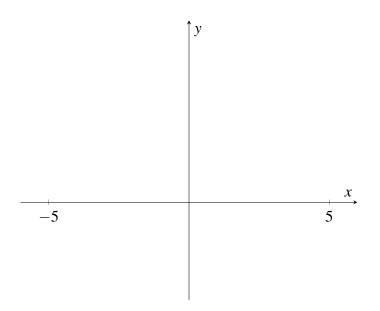**Instructor:**   **Bueler** | **Jurkowski** | **Maxwell**

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. **[5 points]** Sketch a function on $[-5,5]$ that has an absolute maximum value of 4 at $x = 3$, an absolute minimum value of -3 at $x = -1$, and a local maximum at $x = -3$. You should appropriately label notable values on the x- and y-axes for full credit.

2. **[4 points]** Find all critical numbers (a.k.a. critical points) of the function $f(x) = \sqrt[3]{9 - x^2}$. Be careful!

3. [8 points] Find the maximum and minimum values of the function $f(x) = x + \dfrac{4}{x}$ on the interval $[1,5]$.

4. [8 points] Suppose f is continuous on $[-2,2]$ and has a derivative at each point in $(-2,2)$. Suppose $f(-2) = 4$ and $f(2) = -6$.

    a. What specifically does the Mean Value Theorem let you conclude?

    b. Draw a diagram that illustrates the Mean Value Theorem for this problem. Your illustration should include a tangent line somewhere.