

Name: \_\_\_\_\_

TEST 1

MATH 200, SECTION 9

March 12, 2021

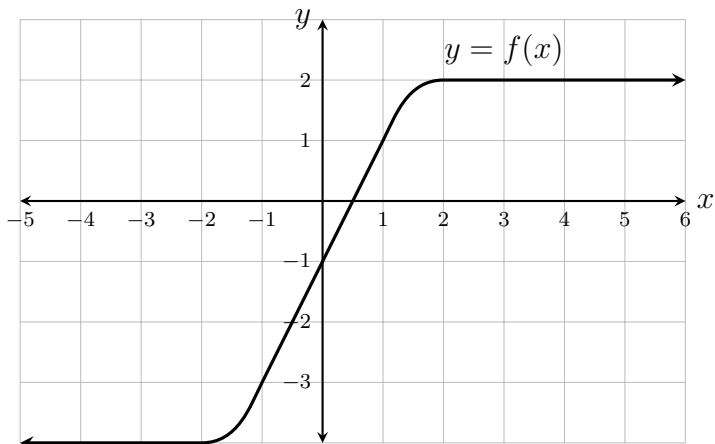
**Directions:** Closed book, closed notes, no calculators. Put all phones, etc., away. You will need only a pencil or pen.

1. (10 points) Use a **limit definition** of the derivative to find the derivative of  $f(x) = \frac{1}{x+1}$ .

2. (12 points) The graph of a function  $f(x)$  is sketched below.

(a) Using the same coordinate axis, sketch a graph of the derivative  $f'(x)$ .

(b) Suppose  $g(x) = (f(x))^4$ . Find  $g'(1)$ .



3. (48 points) Find the derivatives of these functions. You do **not** need to simplify your answers.

(a)  $f(x) = 5x^7 + 3x - \sqrt{2}$

(b)  $f(x) = \sin(x) + \sec(x)$

(c)  $f(x) = \sin(x) \sec(x)$

(d)  $f(x) = \sin(\sec(x))$

(e)  $f(x) = \sec(\sin(x))$

(f)  $f(x) = \frac{\tan(x)}{x^2 + e^x}$

(g)  $f(x) = \sqrt{e^x + x}$

(h)  $y = \cos(e^{x^2+x})$

4. (10 points) Given that  $z = \sin(w^2)$ , find  $\frac{d^2z}{dw^2}$ .

5. (10 points) Find the equation of the tangent line to the graph of  $f(x) = \sqrt{x}$  at  $(4, f(4))$ .

6. (10 points) Find all  $x$  for which the tangent to the graph of  $f(x) = e^{x^3-27x}$  at  $(x, f(x))$  is horizontal.