Math 21A, Winter 2024.

Discussion Problems 3 (Tue., Feb. 6)

1. Assume $x \neq 0$. Compute (*any* way is fine): $\lim\limits_{h \to 0} \dfrac{\frac{1}{(x+h)^5} - \frac{1}{x^5}}{h}$

2. Let

$$f(x) = \begin{cases} \frac{1}{2}x + \frac{5}{2} & x < 1 \\ 2 + \sqrt{x} & x \geq 1 \end{cases}$$

(a) Determine for which x is the function continuous.
(b) Determine for which x is the function differentiable.

3. Let

$$f(x) = x|x| + |x - 1|$$

(a) Determine for which x is the function continuous.
(b) Determine for which x is the function differentiable.

4. Let

$$f(x) = 4x + 6\sqrt{x}$$

(a) Determine the equation of the tangent line to the graph of $y = f(x)$ at $x = 1$.
(b) Determine points on the graph of $y = f(x)$ at which the tangent is parallel to the line $y = 3x + 17$.