

1. (§2.6 #9) Sketch the graph of a function that satisfies all these conditions:

$$f(0) = 3, \lim_{x \rightarrow 0^-} f(x) = 4, \lim_{x \rightarrow 0^+} f(x) = 2, \lim_{x \rightarrow -\infty} f(x) = -\infty,$$

$$\lim_{x \rightarrow 4^+} f(x) = \infty, \lim_{x \rightarrow \infty} f(x) = 3$$

2. Find $f'(x)$ using the definition if $f(x) = \sqrt{x}$.

3. (§2.7 #7) Using the result of the last problem, find an equation of the tangent line to $y = \sqrt{x}$ at the point $(1, 1)$.

4. (§2.6 #50) Find the horizontal and vertical asymptotes of the curve, and state the limits which justify these asymptotes:

$$y = \frac{1 + x^4}{x^2 - x^4}$$

5. (§2.3 #49) Let $g(x) = \frac{x^2 + x - 6}{|x - 2|}$.

- (a) Find $\lim_{x \rightarrow 2^-} g(x)$ and $\lim_{x \rightarrow 2^+} g(x)$.
- (b) Does $\lim_{x \rightarrow 2} g(x)$ exist?

6. (like §2.7 #53) The cost of producing x ounces of gold from a new mine is $C = f(x)$ dollars.

- (a) What is the meaning of the derivative $f'(x)$? What are its units?
- (b) What does the statement $f'(80,000) = 17$ mean?