Part I. Determine whether the statement is true or false:

1. A vertical line intersects the graph of a function at most once.
2. \( f(x) \) must be defined at \( a \) in order for the limit of \( f \) to exist at \( a \).
3. \( f(x) \) must be defined at \( a \) in order for \( f(x) \) to be continuous at \( a \).
4. The limit exists if and only if both left limit and right limit exist.
5. If \( f(x) \) is continuous at \( a \), then \( \lim_{x \to a} f(x) \) exists.
6. If \( \lim_{x \to 0} f(x) = 2 \) and \( \lim_{x \to 0} g(x) = 0 \), then \( \lim_{x \to 0} \frac{f(x)}{g(x)} \) doesn’t exist.
7. If \( \lim_{x \to 0} f(x)g(x) \) exists, then \( \lim_{x \to 0} f(x)g(x) = f(0)g(0) \).
8. If \( f(1) < 0 \) and \( f(3) > 0 \), then there exists a number \( c \) between 1 and 3 such that \( f(c) = 0 \).
9. If \( f(x) \) is continuous on \([-1, 1]\) and \( f(-1) = 4 \), \( f(1) = 3 \), then there is a number \( c \) such that \( |c| < 1 \) and \( f(c) = \pi \).
10. If \( f(x) \) is continuous at 4 and \( f(4) = 2 \), then \( \lim_{x \to 2} f(4x^2 - 12) = 2 \).
11. If \( f \) is continuous at \( a \), then \( f \) is differentiable at \( a \).
12. If \( f \) is differentiable at \( a \), then \( f \) is continuous at \( a \).
13. If \( f'(a) \) exists, then \( \lim_{x \to a} f(x) = f(a) \).
14. An equation of the tangent line to the parabola \( y = x^2 \) at \((-2, 4)\) is \( y - 4 = 2x(x + 2) \).
15. If \( f \) and \( g \) are differentiable, then \( [f(x)g(x)]' = f'(x)g(x) + f(x)g'(x) \).
16. If \( f \) is differentiable, then \( \frac{d}{dx} \sqrt{f(x)} = \frac{f'(x)}{2\sqrt{f(x)}} \).
17. If \( y = e^2 \), then \( y' = 2e \).
18. \( \frac{d}{dx}(10^x) = x10^{x-1} \).
19. \( \frac{d}{dx}(\ln 10) = \frac{1}{10} \).
20. If \( g(x) = x^5 \), then \( \lim_{x \to 2} \frac{g(x) - g(2)}{x - 2} = 80 \).
21. \( \frac{d}{dx} \ln |x| = \frac{1}{|x|} \).

Part II. Show your work.

1. All homework assignments.
2. Section 2.5, p102: 47;
3. Chapter 2 Practice Exercises, p117: 1, 5, 9, 13, 19, 23, 24, 27, 45, 51, 55b, 56e.
4. Chapter 3 Practice Exercises, p213: 5, 9, 12, 16, 27, 33, 39, 45, 57, 59, 64, 67, 77, 84, 85, 98, 103, 125, 128, 131