

# Review for Midterm Exam

Math 226  
Spring, 2015

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

1.  $f(x)$  must be defined at  $a$  in order for the limit of  $f$  to exist at  $a$ .
2.  $f(x)$  must be defined at  $a$  in order for  $f(x)$  to be continuous at  $a$ .
3. The limit exists if and only if both left limit and right limit exist.
4. If  $f(x)$  is continuous at  $a$ , then  $\lim_{x \rightarrow a} f(x)$  exists.
5. If  $\lim_{x \rightarrow 0} f(x) = 2$  and  $\lim_{x \rightarrow 0} g(x) = 0$ , then  $\lim_{x \rightarrow 0} \frac{f(x)}{g(x)}$  doesn't exist.
6. If  $\lim_{x \rightarrow 6} f(x)g(x)$  exists, then  $\lim_{x \rightarrow 6} f(x)g(x) = f(6)g(6)$ .
7. If  $f(1) < 0$  and  $f(3) > 0$ , then there exists a number  $c$  between 1 and 3 such that  $f(c) = 0$ .
8. 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  $f(c) = \pi$ .
9. If  $f(x)$  is continuous at 4 and  $f(4) = 2$ , then  $\lim_{x \rightarrow 2} f(4x^2 - 12) = 2$ .
10.  $\lim_{x \rightarrow a} \frac{x^2 + 6x - 7}{x^2 + 5x - 6} = \frac{\lim_{x \rightarrow a} (x^2 + 6x - 7)}{\lim_{x \rightarrow a} (x^2 + 5x - 6)}$ .
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  $\lim_{x \rightarrow a} f(x) = f(a)$ .
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  $[f(x)g(x)]' = f'(x)g'(x)$ .
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  $\lim_{x \rightarrow 2} \frac{g(x) - g(2)}{x - 2} = 80$ .
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