Wladis, BMCC/CUNY Name_____

Math 301 Test 1: **Test Review**

For numbers 1-5, find the limit:

1. $\lim_{x\to -3}\sqrt{x-5}$
2. $\lim_{x\to 8}\frac{2-\sqrt{x-4}}{x-8}$
3. $\lim_{x\to 3}\frac{x^2-x-6}{x^2-9}$
4. $\lim_{x\to +\infty}\frac{x^2+1}{\sqrt{x^4-1}}$
5. $\lim_{x\to 0}\frac{2x^2-3x+1}{2x-3x^2}$
6. List each of the possible indeterminate forms, and explain why it is indeterminate.
7. We know that $\frac{0}{0}$ is an indeterminate form – explain why this is so, even though $\frac{1}{0}$ is not an indeterminate form. What is the difference between these two forms?
8. Use the $\varepsilon - \partial$ definition of the limit to explain why the limit $\lim_{x\to 1}\frac{x^2-9}{x-1}$ does not exist.
9. Use the limit definition of the derivative to prove the quotient rule on page 127.
10. The height of a ball thrown upward from an initial height of 100 ft above the ground is given by $s(t) = -16t^2 + 27t + 100$, where t is the time in seconds.
    a. What will the position of the ball after 3 seconds?
    b. What will the velocity of the ball be after 3 seconds?
    c. What will the acceleration of the ball be after 3 seconds?
11. $f(x) = 9x^4 + 3x^3 - 7x^2 - x + 9$
    a. Find $f'(x)$
    b. Find $f''(x)$
    c. Find $f^{(4)}(x)$
    d. Find the equation of the tangent line that passes through the point (-1,9).

For numbers 12-14, find $f'(x)$

12. $f(x) = \frac{\sqrt[3]{x-1}}{2x^2-3x}$
13. $f(x) = (3x^2 - 2x + 4)^5$
14. $f(x) = (2x-7)\sqrt[3]{x+5}$
15. Let $f(x) = \frac{x^2-9}{x-1}$. Where is this function:
    a. Defined? (i.e. What is the domain?)
    b. Continuous?
    c. Differentiable?