Name: _____ Period: _____

1. Write the limit definitions for $f'(a)$: _____ and _____

2. Instantaneous Rate of Change is to <u>Tangent</u> <u>Line</u> as Average Rate of Change is to _____ .

3. Average Rate of Change on the interval [a,b] : _____

4. Equation of the Tangent Line : _____

5. Tangent Line to $f(x)$ at $x = a$: _____

6. $\dfrac{d}{dx}x^n =$ _____

7. $\dfrac{d}{dx}\dfrac{1}{x^n} =$ _____

8. $\dfrac{d}{dx}\sqrt{x} =$ _____

9. $\dfrac{d}{dx}c =$ _____

10. $\dfrac{d}{dx}x =$ _____

11. $\dfrac{d}{dx}e^x =$ _____

12. $\dfrac{d}{dx}\sin(x) =$ _____

13. $\dfrac{d}{dx}\cos(x) =$ _____

14. $\dfrac{d}{dx}\tan(x) =$ _____

15. $\dfrac{d}{dx}\csc(x) =$ _____

16. $\dfrac{d}{dx}\sec(x) =$ _____

17. $\dfrac{d}{dx}\cot(x) =$ _____

18. $\dfrac{d}{dx}\ln(x) =$ _____

19. $\dfrac{d}{dx}a^x =$ _____

20. $\dfrac{d}{dx}\log_a(x) =$ _____

21. $\dfrac{d}{dx}\sin^{-1}(x) =$ _____

22. $\dfrac{d}{dx}\cos^{-1}(x) =$ _____

23. $\dfrac{d}{dx}\tan^{-1}(x) =$ _____

24. $\dfrac{d}{dx}\cot^{-1}(x) =$ _____

25. $\dfrac{d}{dx}\sec^{-1}(x) =$ _____

26. $\dfrac{d}{dx}\csc^{-1}(x) =$ _____

27. $\dfrac{d}{dx}f(x)g(x) =$ _____

28. $\dfrac{d}{dx}\dfrac{f(x)}{g(x)} =$ _____

29. $\dfrac{d}{dx}f(g(x)) =$ _____

30. $\dfrac{d}{dx}(f^{-1})'(y) =$ _____

31. If $\lim\limits_{x \to a}\dfrac{f(x)}{g(x)} = 0$, then $\lim\limits_{x \to a} f(x) =$ _____

32. General Term for a Taylor Series: _____
    For 33-35, write out the Taylor Series centered at $x = 0$ for the following:

33. $e^x \approx$ _____

34. $\sin(x) \approx$ _____

35. $\cos(x) \approx$ _____

36. $\displaystyle\int \dfrac{1}{mx+b}\,dx =$ _____

37. $\displaystyle\int x^n\,dx =$ _____

38. $\displaystyle\int e^{mx+b}\,dx =$ _____

39. (5 points) Thoroughly explain ALL of the following concepts to the best of your ability:

   (a) Limit Definition of the Derivative

   (b) Approximations and Linearization

   (c) Approximations and Taylor Series

   (d) PVA