Homework 5

§3.1#17, 19, 29, 37, 49, 59, 63, **58**, **62**

§3.2#1, 3*, 9, 19, 31, 35, 45, **38**, **46**

§3.1 #17. Find the derivative of $g(t) = \frac{1}{t^5}$

§3.1 #19. Find the derivative of $y = \frac{1}{r^{7/2}}$

§3.1 #29. Find the derivative of $f(x) = 5x^4 + \frac{1}{x^2}$

§3.1 #37. Find the derivative of $h(\theta) = \theta(\theta^{-1/2} - \theta^{-2})$

§3.1 #49. Find the derivative of $P = a + b\sqrt{t}$ where a and b are constants

§3.1 #59. Find the equation of the line tangent to $y = x^2 + 3x - 5$ at $x = 2$.

§3.1 #63. For what values of x is the function $y = x^5 - 5x$ both increasing and concave up?

§3.1 #**58**. a) Find the equation of the line tangent to $f(x) = x^3$ at the point where $x = 2$.

b) Graph the tangent line and the function on the same axes. If the tangent line is used to estimate values of the function, will the estimates be overestimates or underestimates?

§3.1 #**62**. On what intervals is the graph of $f(x) = x^4 - 4x^3$ both decreasing and concave up?

§3.2 #1. Find the derivative of $f(x) = 2e^x + x^2$

§3.2 #3*. Find the derivative of $f(x) = a^{5x}$ where $a > 1$ is a constant.

§3.2 #9. Find the derivative of $y = \frac{3^x}{3} + \frac{33}{\sqrt{x}}$

§3.2 #19. Find the derivative of $f(x) = e^k + k^x$ where k is a positive constant.

§3.2 #31. Can the function $y = e^{x+5}$ be differentiated using the rules developed so far? Differentiate if you can; otherwise, indicate why the rules discussed so far do not apply.

§3.2 #35. Can the function $f(\theta) = 4^{\sqrt{\theta}}$ be differentiated using the rules developed so far? Differentiate if you can; otherwise, indicate why the rules discussed so far do not apply.

§3.2 #45. Find the quadratic polynomial $g(x) = ax^2 + bx + c$ which best fits the function $f(x) = e^x$ at $x = 0$, in the sense that $g(0) = f(0)$, $g'(0) = f'(0)$, and $g''(0) = f''(0)$. Using a computer or calculator, sketch graphs of f and g on the same axes. What do you notice?

§3.2 #**38**. An animal population is given by $P(t) = 300(1.044)^t$ where t is the number of years since the study of the population began. Find $P'(5)$ and interpret your result.

§3.2 #**46**. Using the equation of the tangent line to the graph of $y = e^x$ at $x = 0$, show that $e^x \geq 1 + x$ for all values of x.