

Business Calculus, Summer 2004

Homework #3

Due: Tuesday, July 20th, 2004 by end of class

1. Use any rule(s) you like to find the derivatives of

(a) $\frac{x^2-4}{x^4+5x+1}$

(b) $(3x^3 - 7x^2 + 2)e^x$

(c) $\frac{1}{17-28x}$

(d) $x^2 \ln x$

2. Find the equation of the tangent line through the point $(2, -21)$ on the graph of $y = -3x^4 + 4x^2 + 6x - 1$.

3. Find all points on the graph of $y = x^3 - x^2 - 5x$ where the tangent line has slope 2.

4. A penny is dropped off the 86th floor observation deck of the Empire State Building, which is 1050 feet above street level. Ignoring the effects of air friction, the distance (s , in feet) the penny has fallen after t seconds is governed by the formula $s = 16t^2$. How long does it take for the penny to hit the ground, and when it does at what speed is it travelling?

5. Use the approximation principle to estimate the value of $\sqrt{53}$. No calculators allowed on this question except to check your answer.

6. Find the derivatives of

(a) $\sqrt[4]{x^3 - 3x^2 + 2x - 2}$

(b) $\left(\frac{x^2+1}{x-1}\right)^{17}$

(c) $\frac{e^{-4x}}{(x^2-3)^2}$

(d) $\sqrt{x}e^{x^2-3x}$