Name _____

Homework 12
Section 3.9

1. (4) Show that $1 + kx$ is the linearization of $(1 + x)^k$ near $x = 0$. Someone claims the square root of 1.1 is about 1.05. Without a calculator, show why you think this estimate is or isn't about right (hint: use the approximation).

2. (4) Suppose the tangent line approximations of $f(x)$ and $g(x)$ near $x = 2$ are as given:

$$f(x) \approx 2x - 1 \quad \text{and} \quad g(x) \approx a(x - 2) + b$$

Determine the values of $f(2)$, $f'(2)$, $g(2)$, and $g'(2)$.

$f(2) =$_____ $f'(2) =$_____ $g(2) =$_____ $g'(2) =$_____

3. (3ea) Suppose the functions $f(x)$ and $g(x)$ are continuous functions some of whose values are shown in the table below.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
0	1	$2/3$	-3	5
1	4	-2	2	3

(a) Find the local linearization of $\frac{f(x)}{g(x)}$ at $x = 1$.

(b) Use the local linearization of $g\left(f(x)\right)$ at $x = 0$ to approximate $g(f(-1))$.

4. (3ea) Suppose the local linearizations of $f(x)$ and $g(x)$ near $x = 0$ are as given:

$$f(x) \approx 5x - 2 \qquad \text{and} \qquad g(x) \approx -2x + 3$$

(a) Find the tangent line approximation of $f(x) + g(x)$ near $x = 0$.

(b) Find the tangent line approximation of $f(x)g(x)$ near $x = 0$

Bonus (3) Consider the function $f(x) = (x+2)e^{x-2}$. Determine the value of a for which the local linearization near $x = a$ is $(x+2)e^{x-2} \approx 5x - 6$.