Student: ______________________ Date: ______________________	**Instructor:** Carlos Sotuyo **Course:** MAC 2311 – Calculus and Analytical Geometry I	**Assignment:** Section 3.11 Enhanced Assignment

1. Find the linearization L(x) at x = a.

   $f(x) = 4x^3 - 3x + 1 \qquad a = -1$

   L(x) = **9x + 9**

2. Find the linearization L(x) of f(x) = **tan** x at $x = \frac{3\pi}{4}$.

   The linearization is given by L(x) = $\mathbf{-1 + 2x - \frac{3\pi}{2}}$.

   (Type an exact answer, using π as needed.)

3. Find the derivative of y with respect to x.

   $y = \frac{\ln(6x)}{6x}$

   $\frac{dy}{dx} = \mathbf{\frac{1 - \ln(6x)}{6x^2}}$

4. Find a linearization that will replace the function over an interval that includes the given point x_0. Center the linearization not at x_0 but at a nearby integer, x = a, at which the given function and its derivative are easy to evaluate.

   $f(x) = x^2 + 7x, \; x_0 = 0.01$

   Set the center of the linearization as x = **0**.

   L(x) = **7x**

5. Find a linearization at a suitably chosen integer near a at which the given function and its derivative are easy to evaluate.

   $f(x) = \frac{x}{x+4}, \; a = 1.1$

   L(x) = $\mathbf{\frac{4}{25}x + \frac{1}{25}}$

6. Find dy for $y = 9x^4 + 7\sqrt{7x}$.

   dy = $\mathbf{\left(36x^3 + \frac{49}{2\sqrt{7x}}\right)dx}$

7. Find dy.

$$y = \frac{8x}{1+x^2}$$

$dy = \underline{\dfrac{8-8x^2}{\left(x^2+1\right)^2}}\ dx$

8. Find dy.

$$y = \cos\left(9x^2\right)$$

$dy = \underline{-18x\sin\left(9x^2\right)}\ dx$

9. Find dy for $y = e^{5\sqrt{x}}$.

For $y = e^{5\sqrt{x}}$, $dy = \left(\dfrac{5}{2\sqrt{x}}e^{5\sqrt{x}}\right)$ dx.

(Type an exact answer, using radicals as needed.)

10. Find dy.

$$y = \ln\left(3+x^2\right)$$

$dy = \underline{\dfrac{2x}{3+x^2}dx}$

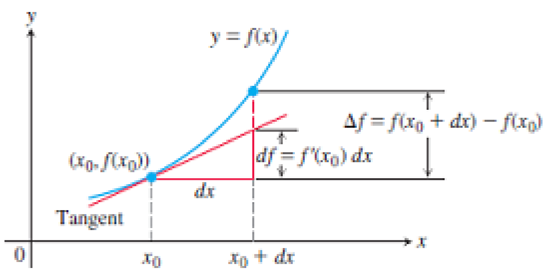
11. Find dy.

$$y = \tan^{-1}\left(e^{x^4}\right)$$

$dy = \underline{\dfrac{4x^3e^{x^4}}{1+e^{2x^4}}}\ dx$

12. The function f(x) changes value when x changes from x_0 to $x_0 + dx$. Find the change $\Delta f = f(x_0 + dx) - f(x_0)$, the value of the estimate $df = f'(x_0)\,dx$, and the approximation error $|\Delta f - df|$.

$f(x) = 8x^2 - 7x,\ \ x_0 = -1,\ \ dx = 0.1$



$\Delta f = \underline{-2.22}$

(Type an integer or a decimal. Do not round.)

$df = \underline{-2.3}$

(Type an integer or a decimal. Do not round.)

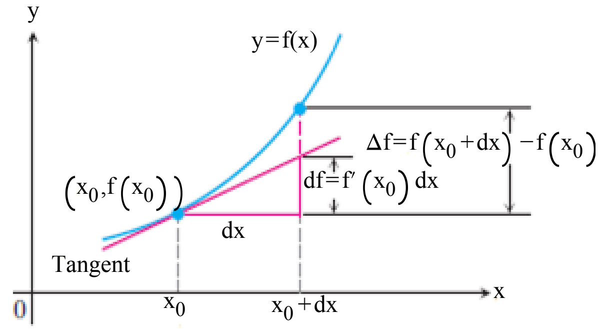
The approximation error is $\underline{0.08}$.

(Type an integer or a decimal. Do not round.)

13. The function f(x) changes value when x changes from x_0 to $x_0 + dx$.

$f(x) = 8x^2 - 7x - 3,\ x_0 = 1,\ dx = 0.1$

a. Find the change $\Delta f = f(x_0 + dx) - f(x_0)$.
b. Find the value of the estimate $df = f'(x_0)\ dx$.
c. Find the approximation error $|\Delta f - df|$.



a. The change Δf is **0.98** .
(Type an integer or a decimal. Do not round.)

b. The value of the estimate df is **0.9** .
(Type an integer or a decimal. Do not round.)

c. The approximation error is **0.08** .
(Type an integer or a decimal. Do not round.)

14. The concentration C in milligrams per milliliter (mg/ml) of a certain drug in a person's blood-stream t hours after a pill is swallowed is modeled by $C(t) = 9 + \frac{2t}{1+t^3} - e^{-0.01t}$. Estimate the change in concentration when t changes from 10 to 40 minutes.

The change in concentration is about **0.987** mg/ml.
(Type an integer or decimal rounded to the nearest thousandth as needed.)