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

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

L(x) = ____________

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

The linearization is given by L(x) = ____________.
(Type an exact answer, using π as needed.)

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

$$y = \frac{\ln(14x)}{14x}$$

$\frac{dy}{dx}$ = ____________

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.

$f(x) = x^3 + 4x, \; x_0 = 0.01$

Set the center of the linearization as x = ____________.

L(x) = ____________

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

$$f(x) = \frac{x}{x+8}, \; a = 0.9$$

L(x) = ____________

6. Find dy for $y = 5x^6 + 9\sqrt{7x}$.

dy = ____________

7. Find dy.

$$y = \frac{3x}{1+2x^2}$$

dy = ____________ dx

8. Find dy.

$$y = \sin\left(7x^2\right)$$

dy = ____________ dx

9. Find dy for $y = e^{\sqrt{x}+1}$.

For $y = e^{\sqrt{x}+1}$, dy = (____________) dx.
(Type an exact answer, using radicals as needed.)

10. Find dy.

$y = \ln\left(1 + x^4\right)$

dy = ____________

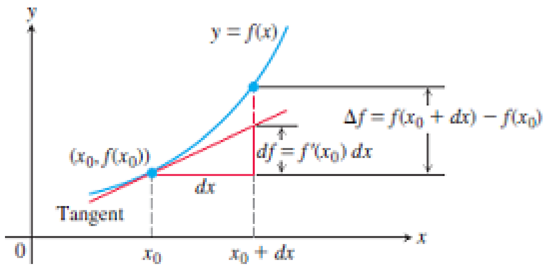
11. Find dy.

$y = \tan^{-1}\left(e^{x^5}\right)$

dy = ____________ 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 $|\Delta f - df|$.

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



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

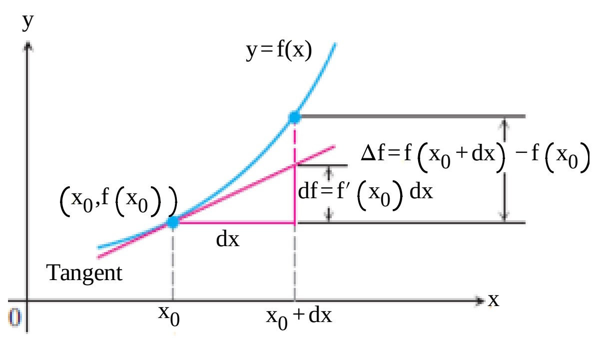
df = ____________
(Type an integer or a decimal. Do not round.)

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

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

$f(x) = 4x^2 + 7x - 3,\ x_0 = 1,\ dx = 0.1$

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



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

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

c. The approximation error is ____________.
(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 $C(t) = 5 + \dfrac{3t}{1 + t^3} - e^{-0.05t}$. Estimate the change in concentration when t changes from 30 to 50 minutes.

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

1. $9x + 9$

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2. $1 + 2x - \frac{\pi}{2}$

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3. $\frac{1 - \mathbf{ln}(14x)}{14x^2}$

---

4. 0

$4x$

---

5. $\frac{8}{81}x + \frac{1}{81}$

---

6. $\left(30x^5 + \frac{63}{2\sqrt{7x}}\right)dx$

---

7. $\frac{3 - 6x^2}{\left(2x^2 + 1\right)^2}$

---

8. $14x\,\mathbf{cos}\left(7x^2\right)$

---

9. $\frac{1}{2\sqrt{x}}\,e^{\sqrt{x}+1}$

---

10. $\frac{4x^3}{1 + x^4}dx$

---

11. $\frac{5x^4\,e^{x^5}}{1 + e^{2x^5}}$

---

12. -2.93

-3

0.07

---

13. 1.54

1.5

0.04

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14. 0.609