

Name _____

Solve the problem. Round your answer, if appropriate.

- 1) As the zoom lens in a camera moves in and out, the size of the rectangular image changes. Assume that the current image is $8 \text{ cm} \times 7 \text{ cm}$. Find the rate at which the area of the image is changing (dA/df) if the length of the image is changing at 0.8 cm/s and the width of the image is changing at 0.1 cm/s . 1) _____

Objective: (3.8) Solve Apps: Related Rates I

- 2) A ladder is slipping down a vertical wall. If the ladder is 13 ft long and the top of it is slipping at the constant rate of 5 ft/s , how fast is the bottom of the ladder moving along the ground when the bottom is 5 ft from the wall? 2) _____

Objective: (3.8) Solve Apps: Related Rates I

- 3) A man flies a kite at a height of 50 m . The wind carries the kite horizontally away from him at a rate of 9 m/sec . How fast is the distance between the man and the kite changing when the kite is 130 m away from him? 3) _____

Objective: (3.8) Solve Apps: Related Rates I

Find the indicated derivative. Assume that x is restricted so that \ln is defined.

- 4) $D_x \ln 8x$ 4) _____

Objective: (3.9) Find Derivative Containing Natural Log

- 5) $D_x \ln \sqrt{3x + 5}$ 5) _____

Objective: (3.9) Find Derivative Containing Natural Log

- 6) $\frac{dy}{dx}$ if $y = \ln(x + 2)^3$ 6) _____

Objective: (3.9) Find Derivative Containing Natural Log

- 7) $\frac{dy}{dx}$ if $y = \ln(5x^3 - x^2)$ 7) _____

Objective: (3.9) Find Derivative Containing Natural Log

8) $\frac{dy}{dx}$ if $y = x^{14} \ln x$

8) _____

Objective: (3.9) Find Derivative Containing Natural Log

9) $f' \left(\frac{7\pi}{4} \right)$ if $f(x) = -\ln(\cos x)$

9) _____

Objective: (3.9) Find Derivative Containing Natural Log

Find D_{xy} .

10) $y = e^{(3 - 4x)}$

10) _____

Objective: (3.9) Find Derivative of Exponential Function

11) $y = e^{\sqrt{x+8}}$

11) _____

Objective: (3.9) Find Derivative of Exponential Function

12) $y = e^{9 \ln x}$

12) _____

Objective: (3.9) Find Derivative of Exponential Function

13) $y = \frac{1}{e^{x^9}}$

13) _____

Objective: (3.9) Find Derivative of Exponential Function

Find $\frac{dy}{dx}$.

14) $y = 3^x$

14) _____

Objective: (3.9) Find Derivative of Logarithmic \ Exponential Function I

15) $y = (x^2 + 2x)^\pi$

15) _____

Objective: (3.9) Find Derivative of Logarithmic \ Exponential Function I

$$16) y = \pi x^2 + 7x$$

Objective: (3.9) Find Derivative of Logarithmic\ Exponential Function I

16) _____

$$17) y = (\cos x)\sqrt{7}$$

Objective: (3.9) Find Derivative of Logarithmic\ Exponential Function I

17) _____

$$18) y = 6^{\cos x}$$

Objective: (3.9) Find Derivative of Logarithmic\ Exponential Function I

18) _____

Find $\frac{dy}{dx}$ by using logarithmic differentiation.

$$19) y = \frac{\sqrt{6x+3}}{6x^3}$$

Objective: (3.9) Use Logarithmic Differentiation

19) _____

$$20) y = \frac{(x+5)(x+2)}{(x-5)(x-2)}$$

Objective: (3.9) Use Logarithmic Differentiation

20) _____

Find D_{xy} .

$$21) y = \cosh x^4$$

Objective: (3.10) Find Derivative of Hyperbolic Function I

21) _____

$$22) y = 3 \sinh^7 x$$

Objective: (3.10) Find Derivative of Hyperbolic Function I

22) _____

$$23) y = \ln(\sinh 4x)$$

Objective: (3.10) Find Derivative of Hyperbolic Function I

23) _____

$$24) y = \sinh 7x \coth x$$

Objective: (3.10) Find Derivative of Hyperbolic Function II

24) _____

Find $\frac{dy}{dx}$.

25) $y = \cos^{-1}(5x^2 - 2)$

25) _____

Objective: (3.10) Find Derivative Involving Inverse Trig Function I

26) $y = \sin^{-1}\left(\frac{10x + 11}{5}\right)$

26) _____

Objective: (3.10) Find Derivative Involving Inverse Trig Function I

27) $y = \tan^{-1}\sqrt{3x}$

27) _____

Objective: (3.10) Find Derivative Involving Inverse Trig Function I

28) $y = 4x^3 \sin^{-1}x$

28) _____

Objective: (3.10) Find Derivative Involving Inverse Trig Function I

Find dy .

29) $y = 6x^2 + 9x + 4$

29) _____

Objective: (3.11) Find Differential

30) $y = \csc(6x^2 - 1)$

30) _____

Objective: (3.11) Find Differential

Find Δy for the given values of x_1 and x_2 .

31) $y = x^3 + 2x$; $x = 2$, $\Delta x = 0.01$

31) _____

Objective: (3.11) Find Value of Differential

Use differentials to calculate the given number.

32) $\sqrt{3.57}$

32) _____

Give your answer as a decimal. Round to 4 decimal places if necessary.

Objective: (3.11) Use Differential to Approximate Value

Find the linearization $L(x)$ of $f(x)$ at $x = a$.

$$33) f(x) = \frac{1}{4x - 3}, a = 0$$

33) _____

Objective: (3.11) Find Linear Approximation

Answer Key

Testname: 13FALL_MATH3A_CH3_3.6_3.11_PROBS

- 1) $6.4 \text{ cm}^2/\text{sec}$
- 2) 12.0 ft/s
- 3) 8.4 m/sec
- 4) $\frac{1}{x}$
- 5) $\frac{3}{2(3x+5)}$
- 6) $\frac{3}{x+2}$
- 7) $\frac{15x-2}{5x^2-x}$
- 8) $14x^{13}\ln x + x^{13}$
- 9) -1
- 10) $-4e^{(3-4x)}$
- 11) $\frac{e^{\sqrt{x+8}}}{2\sqrt{x+8}}$
- 12) $9x^8$
- 13) $-\frac{9x^8}{e^{x^9}}$
- 14) $3^x \ln 3$
- 15) $\pi(x^2+2x)^{\pi-1}(2x+2)$
- 16) $(\pi x^2+7x) \ln \pi(2x+7)$
- 17) $-\sqrt{7}(\cos x)\sqrt{7-1} \sin x$
- 18) $-6^{\cos x} \ln 6 \sin x$
- 19) $\frac{-(5x+3)}{2x^4(6x+3)^{1/2}}$
- 20) $\frac{-14x^2+140}{(x-5)^2(x-2)^2}$
- 21) $4x^3 \sinh x^4$
- 22) $21 \sinh^6 x \cosh x$
- 23) $4 \coth 4x$
- 24) $7 \cosh 7x \coth x - \sinh 7x \operatorname{csch}^2 x$
- 25) $\frac{-10x}{\sqrt{1-(5x^2-2)^2}}$
- 26) $\frac{10}{\sqrt{25-(10x+11)^2}}$
- 27) $\frac{3}{2(1+3x)\sqrt{3x}}$
- 28) $\frac{4x^3}{\sqrt{1-x^2}} + 12x^2 \sin^{-1} x$
- 29) $(12x+9) dx$
- 30) $-12x \csc(6x^2-1) \cot(6x^2-1) dx$
- 31) 0.14
- 32) 1.8925
- 33) $L(x) = -\frac{4}{9}x - \frac{1}{3}$