

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

1. Recently, a certain bank offered a 10-year CD that earns 2.29% compounded continuously.

Use the given information to answer the questions.

(a) If \$20,000 is invested in this CD, how much will it be worth in 10 years?

approximately \$  (Round to the nearest cent.)

(b) How long will it take for the account to be worth \$70,000?

approximately  years (Round to two decimal places as needed.)

2. *Present value.* A promissory note will pay \$40,000 at maturity 7 years from now. How much should you be willing to pay for the note now if money is worth 3.5% compounded continuously?

\$  (Round to the nearest dollar.)

3. How many years are required for an investment to double in value if it is appreciating at the rate of 2% compounded continuously?

At 2% compounded continuously, the investment doubles in  years.  
(Round to one decimal place as needed.)

4. At what nominal rate compounded continuously must money be invested to triple in 8 years?

A rate of % is required for money to triple in 8 years.  
(Do not round until the final answer. Then round to the nearest tenth.)

5. Find  $f'(x)$ .

$$f(x) = 4e^x + 3x - \ln x$$

$$f'(x) = \text{$$

6. Find the equation of the line tangent to the graph of  $f$  at the indicated value of  $x$ .

$$f(x) = 3e^x + 2x; \quad x = 0$$

$$y = \text{} \text{ (Type your answer in slope-intercept form.)}$$

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

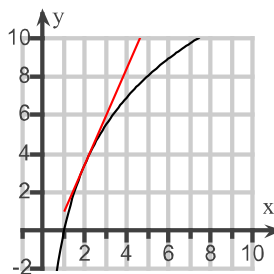
7. Find the equation of the line tangent to the graph of  $f$  at the indicated value of  $x$ .

$$f(x) = \ln x^8; \quad x = e^3$$

$y = \square$  (Type your answer in slope-intercept form. Type an exact answer.)

8.

Look at the graph of  $f(x) = 5 \ln x$  with tangent line at  $x = 2$ . Then answer the questions.



Does the line pass through the origin?

- Yes  
 No  
 Cannot be determined

Will the line tangent at  $x = 3$  pass through the origin?

- Yes  
 No

9. First use the appropriate properties of logarithms to rewrite  $f(x)$ , and then find  $f'(x)$ .

$$f(x) = 24x + \ln 24x$$

Rewrite  $f(x)$  using properties of logarithms.

$f(x) = \square$  (Do not simplify.)

Find  $f'(x)$ .

$f'(x) = \square$  (Simplify your answer.)

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

10. First use appropriate properties of logarithms to rewrite  $f(x)$ , and then find  $f'(x)$ .

$$f(x) = 4 \ln\left(\frac{8}{x}\right)$$

$$f'(x) = \square \text{ (Simplify your answer.)}$$

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

$$y = 5 \ln x + 6 \log_5 x$$

$$\frac{dy}{dx} = \square \text{ (Type an exact answer in simplified form.)}$$

12. Find  $\frac{dy}{dx}$  for the indicated function  $y$ .

$$y = 7^x + e^8$$

$$\frac{dy}{dx} = \square \text{ (Simplify your answer. Do not evaluate.)}$$

13. The salvage value  $S$  (in dollars) of a company jet after  $t$  years is estimated to be given by the formula below. Use the formula to answer the questions.

$$S(t) = 500,000(0.8)^t$$

What is the rate of depreciation (in dollars per year) after 1 year?

\$  per year

(Do not round until the final answer. Then round to the nearest cent as needed.)

What is the rate of depreciation (in dollars per year) after 5 years?

\$  per year

(Do not round until the final answer. Then round to the nearest cent as needed.)

What is the rate of depreciation (in dollars per year) after 10 years?

\$  per year

(Do not round until the final answer. Then round to the nearest cent as needed.)

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

14. Find  $f'(x)$ .

$$f(x) = 6x^5(x^4 - 5)$$

$$f'(x) = \square$$

15. Find  $f'(x)$ .

$$f(x) = \frac{9x - 8}{3x + 1}$$

$$f'(x) = \square$$

16. Find  $f'(x)$ .

$$f(x) = 3x^3 \ln x$$

$$f'(x) = \square$$

17. Use the product rule to find the derivative.

$$y = (3x^2 + 2)(2x - 3)$$

$$y' = \square$$

18. Find  $f'(x)$ .

$$f(x) = \frac{x^2 + 8}{7x - 1}$$

$$f'(x) = \square$$

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

19. Find  $h'(x)$  where  $f(x)$  is an unspecified differentiable function.

$$h(x) = \frac{f(x)}{x^6}$$

Choose the correct answer below.

A.  $h'(x) = \frac{f'(x)}{6x^5}$

B.  $h'(x) = \frac{xf'(x) - 6f(x)}{x^7}$

C.  $h'(x) = \frac{6f(x) - xf'(x)}{x^{12}}$

D.  $h'(x) = \frac{6f'(x)}{x^{12}}$

20. Find the indicated derivative and simplify.

$$y' \text{ for } y = (9 + 2x - 9x^2) e^x$$

$y' = \square$

21. Find  $f'(x)$  and find the equation of the line tangent to the graph of  $f$  at  $x = 1$ .

$$f(x) = (1 + 5x)(3 - 2x)$$

$f'(x) = \square$

$y = \square$  (Type your answer in slope-intercept form.)

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

22. Find  $f'(x)$  and find the equation of the line tangent to the graph of  $f$  at  $x = 3$ .

$$f(x) = \frac{5x}{2^x}$$

$$f'(x) = \square$$

Find the equation of the line tangent to the graph at  $x = 3$ .

$$y = \square$$

23. Find  $f'(x)$  and find the value(s) of  $x$  where  $f'(x) = 0$ .

$$f(x) = (2x - 9)(x^2 + 6)$$

$$f'(x) = \square$$

$$x = \square$$

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

24. Find the indicated derivative and simplify.

$$\frac{dy}{dx} \text{ for } y = 64x^{\frac{1}{8}}(x^8 + 8)$$

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

25. Find the indicated derivative and simplify.

$$y' \text{ for } y = \frac{\log_5 x}{3 + x^5}$$

$$y' = \square$$

26. Find the indicated derivative and simplify.

$$f'(x) \text{ for } f(x) = \frac{9\sqrt[3]{x}}{x^2 - 7}$$

$$f'(x) = \square$$

**Student:** \_\_\_\_\_  
**Date:** \_\_\_\_\_  
**Time:** \_\_\_\_\_

**Instructor:** Dan Yasaki  
**Course:** MAT 120 (Summer 2013)  
**Book:** Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

**Assignment:** 4.1-4.3 Homework

27. Find the indicated derivative and simplify.

$$\frac{d}{dx} \left[ \frac{2x^3 - 9x^2}{\sqrt[3]{x^2}} \right]$$

$$\frac{d}{dx} \left[ \frac{2x^3 - 9x^2}{\sqrt[3]{x^2}} \right] = \square$$

Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

28. The total sales of  $S$  (in thousands of DVD's) of a certain movie are given by the following formula where  $t$  is the number of months since the release of the DVD. Use the formula to answer the questions.

$$S(t) = \frac{90t^2}{t^2 + 150}$$

- a) Find  $S'(t)$ .

$$S'(t) = \square$$

- b) Find  $S(15)$  and  $S'(15)$ .

The value of  $S(15)$  rounded to the nearest hundredth is  $\square$ .

The value of  $S'(15)$  rounded to the nearest hundredth is  $\square$ .

What do the values  $S(15) = 54$  and  $S'(15) = 2.88$  indicate?

- A. After 15 months, the total sales are 54,000 DVD's and the sales are increasing at the rate of 2880 DVD's per month.
- B. After 15 months, the total sales are 2880 DVD's and the sales are increasing at the rate of 54 DVD's per month.
- C. After 15 months, the total sales are 54,000 DVD's and the sales are increasing at the rate of 2.88 DVD's per month.
- D. After 15 months, the total sales are 28,800 DVD's and the sales are increasing at the rate of 5400 DVD's per month.

- c) Use the results from part (b) to estimate the total sales after 16 months.

After 16 months, the total sales will be approximately how many DVD's?

$\square$  (Round to the nearest whole number.)



Student: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Instructor: Dan Yasaki  
Course: MAT 120 (Summer 2013)  
Book: Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

Assignment: 4.1-4.3 Homework

1. 25,146.84  
54.71

2. 31,308

3. 34.7

4. 13.7

5.  $4e^x + 3 - \frac{1}{x}$

6.  $5x + 3$

7.  $\frac{8}{e^3}x + 16$

8. No  
No

9.  $24x + \ln 24 + \ln x$   
 $24 + \frac{1}{x}$

10.  $-\frac{4}{x}$

11.  $\frac{5}{x} + \frac{6}{x \ln 5}$

12.  $7^x \ln 7$

13. -89,257.42  
-36,559.84  
-11,979.93

**Student:** \_\_\_\_\_  
**Date:** \_\_\_\_\_  
**Time:** \_\_\_\_\_

**Instructor:** Dan Yasaki  
**Course:** MAT 120 (Summer 2013)  
**Book:** Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

**Assignment:** 4.1-4.3 Homework

14.  $54x^8 - 150x^4$

15.  $\frac{33}{(3x+1)^2}$

16.  $3x^2 + 9x^2 \ln x$

17.  $18x^2 - 18x + 4$

18.  $\frac{7x^2 - 2x - 56}{(7x-1)^2}$

19. B

20.  $e^x(11 - 16x - 9x^2)$

21.  $13 - 20x$   
 $- 7x + 13$

22.  $\frac{5 - 5x \ln 2}{2^x}$   
 $\frac{5 - 15 \ln 2}{8}x + \frac{45 \ln 2}{8}$

23.  $6x^2 - 18x + 12$   
2,1

24.  $\frac{520x^8 + 64}{x^{\frac{7}{8}}}$

25.  $\frac{3 + x^5 - 5x^5 \ln x}{(3 + x^5)^2 x \ln 5}$

**Student:** \_\_\_\_\_  
**Date:** \_\_\_\_\_  
**Time:** \_\_\_\_\_

**Instructor:** Dan Yasaki  
**Course:** MAT 120 (Summer 2013)  
**Book:** Barnett: Calculus for Business,  
Economics, Life/Social Sciences, 12e

**Assignment:** 4.1-4.3 Homework

26. 
$$\frac{-15x^2 - 21}{x^3(x^2 - 7)^2}$$

27. 
$$\frac{14}{3}x^{\frac{4}{3}} - 12x^{\frac{1}{3}}$$

28. 
$$\frac{27000t}{(t^2 + 150)^2}$$
  
54  
2.88  
A  
56,880