

**Practice for Chapter 1** Name \_\_\_\_\_

**Applied Calculus 05** (Goldstein10th) created 13 Jan 05 ptch1\_appcalc\_05g10.tst

DO NOT EXPECT THE TESTS TO BE THE SAME. TESTS MAY BE TOTALLY DIFFERENT.

You need to attend class, pay attention and do your homework to learn statistics and prepare for the tests.

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

1) Find the derivative of  $f(x) = \frac{1}{x^2}$ . 1) \_\_\_\_\_

2) Find the slope of the tangent line to the curve  $y = \sqrt[3]{x^2}$  at the point (8, 4), and write the equation of this line. 2) \_\_\_\_\_

3) Determine:  $\frac{dy}{dx}$  if  $y = \frac{x-2}{5}$  3) \_\_\_\_\_

**Calculate the following limit(s) if they exist.**

4)  $\lim_{x \rightarrow -1} (x^3 - 2x + 5)$  4) \_\_\_\_\_

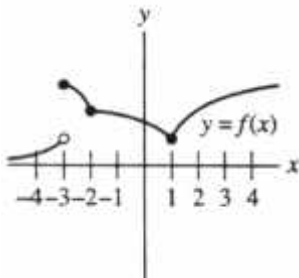
5)  $\lim_{x \rightarrow 0} \frac{(x+1)^{1/2} - 1}{x}$  5) \_\_\_\_\_

6)  $\lim_{x \rightarrow -1} \frac{x^2 - 4x - 5}{x + 1}$  6) \_\_\_\_\_

7) Let  $f(x) = (2x + 1)^2$ . Compute  $f'(0)$  using limits. 7) \_\_\_\_\_

8) Compute  $\lim_{x \rightarrow \infty} \frac{x^3}{x^3 - 1}$ . 8) \_\_\_\_\_

9) In the graph of  $y = f(x)$ , for which values of  $x$  is  $f(x)$  not continuous? 9) \_\_\_\_\_



10) Let  $f(x) = \frac{x^3 - 9x}{2x + 6}$ . Does  $\lim_{x \rightarrow -3} f(x)$  exist? If so, give the limit. 10) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 11) A company is planning to manufacture a new blender. After conducting extensive market surveys, the research department estimates a weekly demand of 600 blenders at a price of \$50 per blender and a weekly demand of 800 blenders at a price of \$40 per blender. Assuming the demand equation is linear, use the research department's estimates to find the revenue equation in terms of the demand  $x$ . 11) \_\_\_\_\_
- A)  $R(x) = 80x - 20$  B)  $R(x) = 20x + \frac{x^2}{20}$
- C)  $R(x) = 80x - \frac{x^2}{20}$  D)  $R(x) = 80x - 20x^2$

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 12) The function  $f(x) = \frac{x^2 + 2x - 35}{x + 7}$  is continuous everywhere except at  $x = -7$ . 12) \_\_\_\_\_  
If possible, define  $f(x)$  at  $x = -7$  in a way that makes  $f(x)$  continuous for all  $x$ .
- 13) Differentiate:  $f(x) = \frac{1}{x^2 + 5}$  13) \_\_\_\_\_
- 14) Differentiate:  $F(x) = \sqrt{3x + 1}$  14) \_\_\_\_\_
- 15) Differentiate:  $y = \frac{2}{\sqrt{2x + 1}}$  15) \_\_\_\_\_
- 16) Differentiate:  $y = \frac{4}{3x^3 + x^2 + 4}$  16) \_\_\_\_\_
- 17) Find the slope of the graph of  $y = x^9 - 2x + (\sqrt{5 - x})^3$  at  $(1, 7)$ . 17) \_\_\_\_\_
- 18) Find the equation of the tangent line to the curve  $y = \sqrt{x^2 + 1}$  at  $(2, \sqrt{5})$ . 18) \_\_\_\_\_
- 19) Find the equation of the tangent line to the curve  $y = x^3 + 3x - 8$  at  $x = 2$ . 19) \_\_\_\_\_
- 20) Find the first derivative of  $y = (x^3 + 4x)^5$ . 20) \_\_\_\_\_
- 21) Find the first derivative of  $z = 4t + (3 - \sqrt{2t + 1})^3$ . 21) \_\_\_\_\_
- 22) Find the first and second derivatives of  $y = (x - 4)^5$  22) \_\_\_\_\_
- 23) Find the first and second derivatives of  $y = \pi + \sqrt{3}$  23) \_\_\_\_\_
- 24) Let  $f(t) = t^3 - \frac{9}{t}$ . Compute  $\left. \frac{d^2f}{dt^2} \right|_{t=3}$ . 24) \_\_\_\_\_
- 25) Compute  $\frac{d}{dt} \left( \frac{dv}{dt} \right)$ , where  $v = -5t^3 + \frac{2}{1-t}$  25) \_\_\_\_\_

- 26) Compute the third derivative of  $f(x) = 3x^4 - 4x^3 + 5x + 1$ . 26) \_\_\_\_\_
- 27) A ball is thrown straight up. Its height, in feet, at time  $t$ , in seconds, is represented by the equation  $h = 30t - 50t^2$ . Determine the instantaneous velocity of the ball at  $t = 2$ . 27) \_\_\_\_\_
- 28) A point  $P$  is moving along the  $x$ -axis. At any time  $t$ , the location of  $P$  on the  $x$ -axis is described by  $x = t^3 - 4t^2 + 3t$ . Determine the instantaneous acceleration at time  $t = 5$  of the point  $P$ . 28) \_\_\_\_\_

**A rock is thrown off a cliff. Its distance from the ground below at  $t$  seconds is  $s(t) = -16t^2 + 16t + 96$  feet.**

- 29) What is the velocity after 1 second? 29) \_\_\_\_\_
- 30) When will it hit the ground? 30) \_\_\_\_\_
- 31) What is the velocity of the rock when it slams into the ground? 31) \_\_\_\_\_
- 32) How high was the cliff? 32) \_\_\_\_\_

**Water is pouring into a tub such that after  $t$  minutes, there are  $G(t) = t^3 - t^2 + 0.3t$  gallons in the tub.**

- 33) What is the average rate at which water pours into the tub over the first 4 minutes? 33) \_\_\_\_\_
- 34) At what instantaneous rate is the water flowing when  $t = 4$ ? 34) \_\_\_\_\_

## Answer Key

Testname: PTCH1\_APPCALC\_05G10

1)  $-\frac{2}{x^3}$

ID: CALC10G 1.3.2-3

Page Ref:

2) slope =  $\frac{1}{3}$ ;  $y = \frac{1}{3}x + \frac{4}{3}$

ID: CALC10G 1.3.2-8

Page Ref:

3)  $\frac{1}{5}$

ID: CALC10G 1.3.2-10

Page Ref:

4) 6

ID: CALC10G 1.4.2-3

Page Ref:

5)  $\frac{1}{2}$

ID: CALC10G 1.4.2-4

Page Ref:

6) -6

ID: CALC10G 1.4.2-10

Page Ref:

7) 4

ID: CALC10G 1.4.2-20

Page Ref:

8) 1

ID: CALC10G 1.4.2-22

Page Ref:

9)  $x = -3$

ID: CALC10G 1.5.2-1

Page Ref:

10) Yes; 9.

ID: CALC10G 1.5.2-4

Page Ref:

11) C

ID: CALC10G 1.5.2-7

Page Ref:

12)  $f(x) = \begin{cases} \frac{x^2 + 2x - 35}{x + 7} & \text{for } x \neq -7 \\ -2 & \text{for } x = -7 \end{cases}$

ID: CALC10G 1.5.2-6

Page Ref:

## Answer Key

Testname: PTCH1\_APPCALC\_05G10

$$13) f'(x) = -\frac{2x}{(x^2 + 5)^2}$$

ID: CALC10G 1.6.2-5

Page Ref:

$$14) F'(x) = \frac{3}{2}(3x + 1)^{-1/2}$$

ID: CALC10G 1.6.2-6

Page Ref:

$$15) \frac{dy}{dx} = -2(2x + 1)^{-3/2}$$

ID: CALC10G 1.6.2-13

Page Ref:

$$16) \frac{dy}{dx} = \frac{-36x^2 - 8x - 16}{(3x^3 + x^2 + 4x)^2}$$

ID: CALC10G 1.6.2-14

Page Ref:

$$17) 4$$

ID: CALC10G 1.6.2-18

Page Ref:

$$18) y = \frac{2}{\sqrt{5}}x + \frac{\sqrt{5}}{5}$$

ID: CALC10G 1.6.2-22

Page Ref:

$$19) y - 6 = 15(x - 2)$$

ID: CALC10G 1.6.2-26

Page Ref:

$$20) 5(x^3 + 4x)^4 (3x^2 + 4)$$

ID: CALC10G 1.7.2-1

Page Ref:

$$21) 4 - \frac{3(3 - \sqrt{2t + 1})^2}{\sqrt{2t + 1}}$$

ID: CALC10G 1.7.2-2

Page Ref:

$$22) y' = 5(x - 4)^4$$

$$y'' = 20(x - 4)^3$$

ID: CALC10G 1.7.2-5

Page Ref:

$$23) y' = 0$$

$$y'' = 0$$

ID: CALC10G 1.7.2-6

Page Ref:

## Answer Key

Testname: PTCH1\_APPCALC\_05G10

24)  $\frac{52}{3}$

ID: CALC10G 1.7.2-9

Page Ref:

25)  $\frac{d}{dt}\left(\frac{dv}{dt}\right) = -30t + \frac{4}{(1-t)^3}$

ID: CALC10G 1.7.2-13

Page Ref:

26)  $f''(x) = 72x - 24$

ID: CALC10G 1.7.2-14

Page Ref:

27)  $-170 \text{ ft/sec}$

ID: CALC10G 1.8.2-1

Page Ref:

28) 22

ID: CALC10G 1.8.2-4

Page Ref:

29)  $-16 \text{ ft/sec}$

ID: CALC10G 1.8.2-5

Page Ref:

30) after 3 seconds

ID: CALC10G 1.8.2-6

Page Ref:

31)  $80 \text{ ft/sec}$

ID: CALC10G 1.8.2-7

Page Ref:

32) 96 ft

ID: CALC10G 1.8.2-8

Page Ref:

33) 12.3 gal/min.

ID: CALC10G 1.8.2-13

Page Ref:

34) 40.3 gal/min.

ID: CALC10G 1.8.2-14

Page Ref: