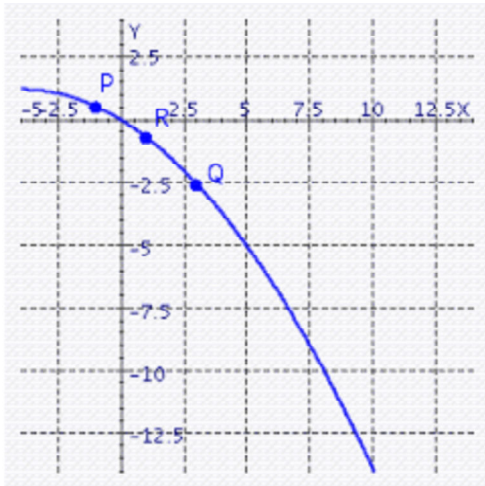**Name:** _____
Class: _____
Date: _____

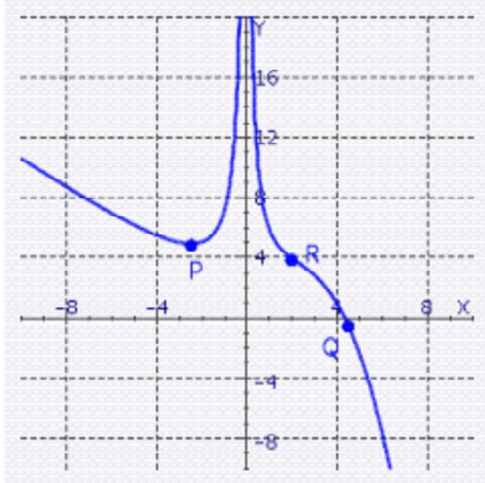# MAC 2233 Chapter 3 Practice for the Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1. At which labeled point is the slope of the tangent least (in the sense that -7 is less than 1)?

 a. *R*
 b. *P*
 c. *Q*

_____ 2. At which labeled point is the slope of the tangent greatest?

    a. Q
    b. R
    c. P

Multiple Response
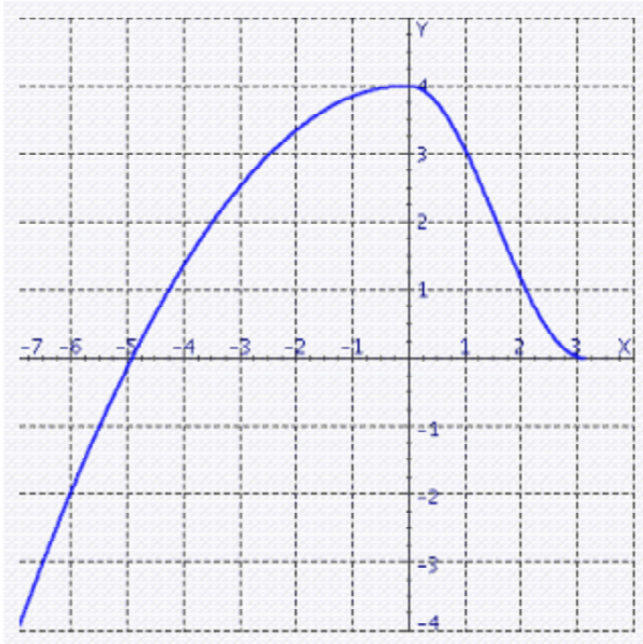*Identify one or more choices that best complete the statement or answer the question.*

_____ 3. Estimate the limit numerically.

$$\lim_{x \to 0} \frac{x^2}{x + 9}$$

    a.   diverges to $+\infty$
    b.   diverges to $-\infty$
    c.   -9
    d.   1
    e.   0

Numeric Response

4. Use the graph to compute $\lim\limits_{x \to -6} f(x)$.

5. Calculate the average rate of change of the given function over the interval $\left[-8, -6\right]$.

x	−8	−7	−6	−5
$f(x)$	−10.1	−2.4	−2.7	−0.8

6. The function given below gives the cost to manufacture x items. Estimate (using $h = 0.0001$) the instantaneous rate of change of the cost at the production level $x = 1,300$.

$$C(x) = 9,700 + 4x - \frac{x^2}{11,000}$$

Enter your answer as a number without the units rounded to the nearest tenth.

7. Estimate the derivative of the function $f(x) = 2 - 5x$ at the point $x = 9$.

Please round the answer to the nearest whole number.

8. Compute $f'(a)$ algebraically for $a = 2$.

$$f(x) = 7x^2 + x$$

Short Answer

9. Calculate the average rate of change of the given function over the interval $[3, 5]$.

x	2	3	4	5
$f(x)$	6	5	1	–3

10. Calculate the average rate of change of the given function over the interval $[7, 10]$.

$$f(x) = \frac{70}{x}$$

11. Calculate the average rate of change of the given function f over the intervals $[a, a + h]$, where $h = 2, 0.2,$ 0.02, 0.002, and 0.0002. (It will be easier to do this if you first simplify the difference quotient (dq) as much as possible.)
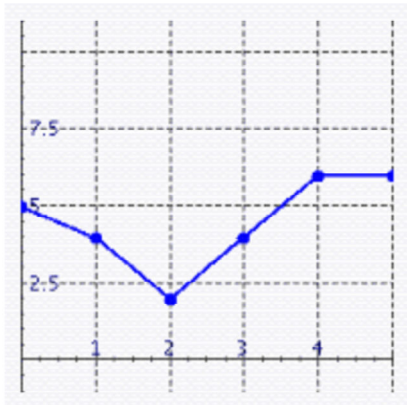
$$f(x) = 4x^2 - 6x; \ \ a = 7$$

Complete the table.

h	dq
2	
0.2	
0.02	
0.002	
0.0002	

12. Compute $f'(3)$.

$$f(x) = -6.9x^2 + 5.5$$

13. Calculate the average rate of change of the given function (Inflation(%)) over the interval $[1, 4]$.

Please enter your answer as a fraction without the units.

14. Compute $f'(a)$ for $a = 3$.

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

Enter your answer in fraction form.

15. Compute the derivative function $f'(x)$ algebraically.

$$f(x) = -x^2 - 8x$$

16. Find an equation of the tangent line to the graph of the function $f(x) = 2\sqrt{x}$ at the point that has x-coordinate $x = 16$. [*Hint*: use point-slope formula to find the equation of the tangent line.]

17. Estimate the limit numerically.

$$\lim_{x \to 8} \frac{x^2 - 64}{x - 8}$$

18. Calculate the average rate of change of the given function over the interval $[4, 9]$.

$$f(x) = 7x^2 - \frac{x}{10}$$

19. Calculate the average rate of change of the given function f over the intervals $[a, a + h]$, where $h = 2, 0.2$, 0.02, 0.002, and 0.0002. (It will be easier to do this if you first simplify the difference quotient (dq) as much as possible.)
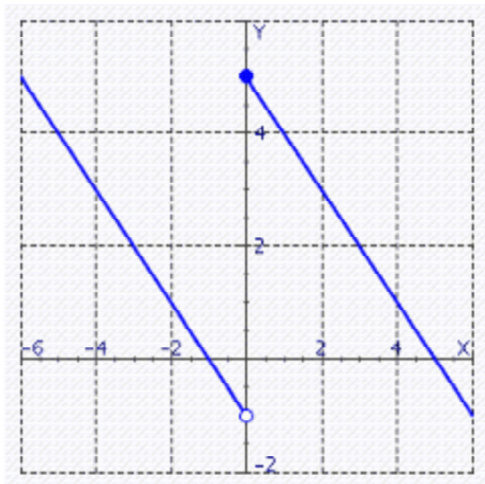
$f(x) = 12x^2; \ a = 0$

Complete the table.

h	dq
2	
0.2	
0.02	
0.002	
0.0002	

20. Estimate the limit numerically.

$$\lim_{x \to -3} \frac{x^2 + 6x + 9}{x + 3}$$

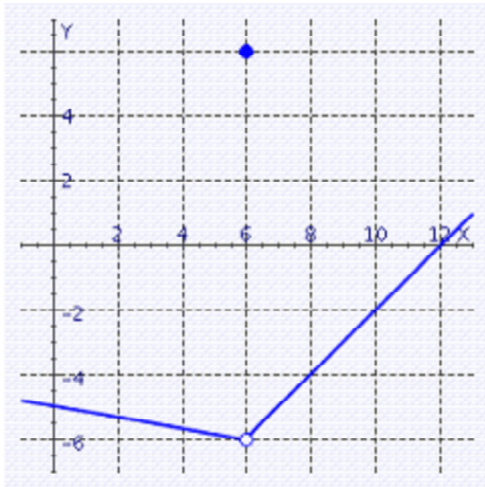21. Use the graph to compute $\lim_{x \to 0^+} f(x)$ and $\lim_{x \to 0^-} f(x)$.

22. Estimate the limit numerically.

$$\lim_{x \to -\infty} \frac{x^6 + 2{,}000x^3 + 800{,}000}{2x^6 + 1{,}150x^3}$$

23. Estimate the limit numerically.

$$\lim_{x \to +\infty} 2xe^{-x}$$

24. Use the graph to compute $\lim_{x \to 6} f(x)$ and $f(6)$.

25. The function given below gives the cost to manufacture x items. Estimate (using $h = 0.0001$) the instantaneous rate of change of the cost at the production level $x = 1,300$.

$$C(x) = 10{,}600 + 3x - \frac{x^2}{11{,}000}$$

Select your answer rounded to the nearest tenth.

26. Calculate the average rate of change of the given function over the interval $[4, 5]$.

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

27. The function $R(t) = 54t - t^2$ represents the value of the U.S. dollar in Indian rupees as a function of time t in days. Find the average rates of change of $R(t)$ over the time intervals $[t, t + h]$, where t is as indicated and $h = 1, 0.1, 0.01$, and 0.001 days. Hence, estimate (using $h = 0.0001$) the instantaneous rate of change of R at time $t = 7$.

Please round the instantaneous rate to the nearest whole number.

28. The function $R(t) = 110 + 7t^3$ represents the value of the U.S. dollar in Indian rupees as a function of time t in days. Estimate (using $h = 0.0001$) the instantaneous rate of change of R at time $t = 3$.

    Please select the correct answer rounded to the nearest whole number.

29. Estimate the derivative of the function $f(x) = 8 - 5x$ at the point $x = 4$.

    Select the answer rounded to the nearest whole number.

30. Estimate the derivative of the function $f(x) = \dfrac{x^2}{8} - \dfrac{x^3}{12}$ at the point $x = -5$.

    Please select the correct answer rounded to the nearest hundredth.

31. Estimate $g'(4)$ of the function $g(t) = \dfrac{1}{t^3}$.

32. Estimate the slope of the tangent to the graph of the following function at the point $x = -2$.

    $f(x) = x^4$

33. Estimate $\left. \dfrac{dy}{dx} \right|_{x=-6}$ of the function $y = 1 - x^2$.

34. Estimate $\left. \dfrac{dR}{dp} \right|_{p=16}$ of the function $R = \dfrac{17}{p}$.

35. Use any method to find the slope of the tangent to the graph of the function $f(x) = \dfrac{1}{x^2}$ at the point that has x-coordinate $x = 3$.

36. If a stone is dropped from a height of 466 feet, its height after t seconds is given by $S = 466 - 8t^2$. Find the stone's average velocity over the period [4, 6].

37. Compute the derivative function $f'(x)$ algebraically.

    $f(x) = \dfrac{6}{x}$

8

38. Compute $f'(a)$ for $a = 4$.

$f(x) = x^2 - 5$

39. Compute $f'(a)$ for $a = 0$.

$f(x) = -x^2 - 8x$

40. Calculate the average rate of change of the given function over the interval $[5, 9]$.

t (month)	5	7	9
$R(t)$ ($ millions)	41.3	41.8	40.8

41. Compute the derivative function $f'(x)$ algebraically.

$f(x) = 11 - 3x^3$

42. Compute the derivative function $f'(x)$ algebraically.

$f(x) = 4x^2 + x$

Matching

Estimate the limits numerically.

Choose the correct letter for each question.

a. $\displaystyle\lim_{x \to +\infty} \frac{13x^2 + 6x - 1}{2x^2 - 2x}$

b. $\displaystyle\lim_{x \to -\infty} \frac{x^5 - 6{,}000x^4}{2x^5 + 2{,}000}$

c. $\displaystyle\lim_{x \to +\infty} \frac{4x^2 + 6x + 13}{2x^2 - 1}$

____ 43. $\dfrac{13}{2}$

____ 44. 2

____ 45. $\dfrac{1}{2}$

MAC 2233 Chapter 3 Practice for the Test
Answer Section

MULTIPLE CHOICE

    1. ANS: C   PTS: 1
    2. ANS: C   PTS: 1

MULTIPLE RESPONSE

    3. ANS: E   PTS: 1

NUMERIC RESPONSE

    4. ANS: –2

        PTS: 1
    5. ANS: 3.7

        PTS: 1
    6. ANS: 3.8

        PTS: 1
    7. ANS: -5

        PTS: 1
    8. ANS: 29

        PTS: 1

SHORT ANSWER

    9. ANS:
        –4

        PTS: 1
   10. ANS:
        –1

        PTS: 1

11. ANS:
    dq
    58
    50.8
    50.08
    50.008
    50.0008

    PTS: 1
12. ANS:
    $f'(3) = -41.4$

    PTS: 1
13. ANS:
    $\dfrac{2}{3}$

    PTS: 1
14. ANS:
    $-\dfrac{2}{9}$

    PTS: 1
15. ANS:
    $-2x - 8$

    PTS: 1
16. ANS:
    $y = \dfrac{x}{4} + 4$

    PTS: 1
17. ANS:
    16

    PTS: 1
18. ANS:
    90.9

    PTS: 1

19. ANS:
    dq
    24
    2.4
    0.24
    0.024
    0.0024

    PTS: 1
20. ANS:
    0

    PTS: 1
21. ANS:

    $\lim_{x \to 0^+} f(x) = 5, \lim_{x \to 0^-} f(x) = -1.$

    PTS: 1
22. ANS:

    $\dfrac{1}{2}$

    PTS: 1
23. ANS:
    0

    PTS: 1
24. ANS:

    $\lim_{x \to 6} f(x) = -6$ and $f(6) = 6$

    PTS: 1
25. ANS:
    2.8

    PTS: 1
26. ANS:
    9

    PTS: 1
27. ANS:
    40

    PTS: 1

28. ANS:
189

PTS: 1
29. ANS:
-5

PTS: 1
30. ANS:
−7.5

PTS: 1
31. ANS:
$-\dfrac{3}{256}$

PTS: 1
32. ANS:
−32

PTS: 1
33. ANS:
12

PTS: 1
34. ANS:
$-\dfrac{17}{256}$

PTS: 1
35. ANS:
$-\dfrac{2}{27}$

PTS: 1
36. ANS:
−80

PTS: 1
37. ANS:
$f'(x) = -\dfrac{6}{x^2}$

PTS: 1

38. ANS:
   8

   PTS: 1
39. ANS:
   -8

   PTS: 1
40. ANS:
   -$125,000

   PTS: 1
41. ANS:
   $f'(x) = -9x^2$

   PTS: 1
42. ANS:
   $f'(x) = 8x + 1$

   PTS: 1

MATCHING

43. ANS: A   PTS: 1
44. ANS: C   PTS: 1
45. ANS: B   PTS: 1