

CUMULATIVE PRACTICE PROBLEMS  
FUNDAMENTALS OF COLLEGE MATHEMATICS 2  
MA 122

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Perform the indicated operations. Write the answer in the form  $a + bj$ .

1)  $(6 + 6j) - (-3 + j)$

A)  $-9 - 5j$

B)  $9 + 5j$

C)  $9 - 5j$

D)  $3 + 7j$

1) \_\_\_\_\_

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Write the complex number in polar form.

2)  $-15 - 20j$

2) \_\_\_\_\_

Answer:  $25(\cos 233.1^\circ + j \sin 233.1^\circ)$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Perform the indicated operations. Write the result in the form  $a + bj$ .

3)  $\frac{8 + 2j}{7 - 3j}$

3) \_\_\_\_\_

A)  $\frac{25 - 19j}{40}$

B)  $\frac{25 + 19j}{29}$

C)  $\frac{62 + 10j}{29}$

D)  $\frac{62 - 19j}{40}$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Change the number to polar form and then perform the indicated operations. Express the result in rectangular form.

4)  $(2 - 2j)^5$

4) \_\_\_\_\_

Answer:  $-128 + 128j$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find all the roots of the complex number. Put answers in standard form.

5) Cube roots of  $-8j$

5) \_\_\_\_\_

A)  $-2j, \sqrt{3} + j, \sqrt{3} + j$

B)  $-2j, \sqrt{3} - j, \sqrt{3} - j$

C)  $2j, -\sqrt{3} + j, -\sqrt{3} + j$

D)  $2j, -\sqrt{3} - j, \sqrt{3} - j$

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Perform the indicated operations. Write the result in the form  $a + bj$ .

6)  $(3 - 2j)(2 + 8j)$

6) \_\_\_\_\_

Answer:  $22 + 20j$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Rewrite the expression as the logarithm of a single quantity.

7)  $\log_3 10 - \log_3 x$

7) \_\_\_\_\_

A)  $\log_3 (x/10)$

B)  $\log_3 (10 - x)$

C)  $\log_6 (10/x)$

D)  $\log_3 (10/x)$

Answer: D

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

SHOW ALL YOUR WORK.

8)  $\log_3 5 + \log_3 y$

8) \_\_\_\_\_

Answer:  $\log_3 5y$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Solve the equation.

9)  $\ln (3x - 5) = \ln 10 - \ln (x - 2)$

9) \_\_\_\_\_

A)  $11/3$

B)  $0, 11/3$

C)  $\emptyset$

D)  $2, 2/3$

Answer: A

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

SHOW ALL YOUR WORK.

10)  $\log_9 (x - 2) + \log_9 (x - 2) = 1$

10) \_\_\_\_\_

Answer: 5

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Determine the center and the radius of the circle.

11)  $(x + 2)^2 + (y + 6)^2 = 16$

11) \_\_\_\_\_

A)  $(-6, -2), r = 4$

B)  $(-2, -6), r = 4$

C)  $(6, 2), r = 16$

D)  $(2, 6), r = 16$

Answer: B

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

SHOW ALL YOUR WORK.

Find the equation of the circle from the given information.

12) Center at  $(-9, -5)$ , radius 4

12) \_\_\_\_\_

Answer:  $(x + 9)^2 + (y + 5)^2 = 16$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Determine the coordinates of the focus and the equation of the directrix of the parabola.

13)  $x^2 = -32y$

13) \_\_\_\_\_

A)  $F(-16, 0), x = 8$

B)  $F(0, -8), y = 8$

C)  $F(0, -8), y = -8$

D)  $F(0, 8), y = -8$

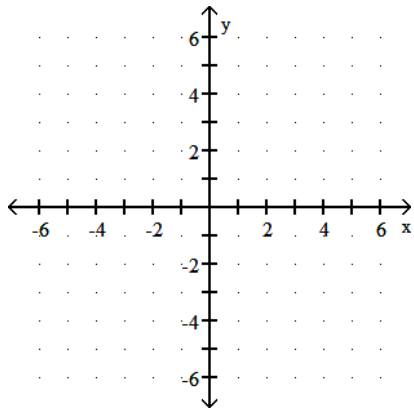
Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

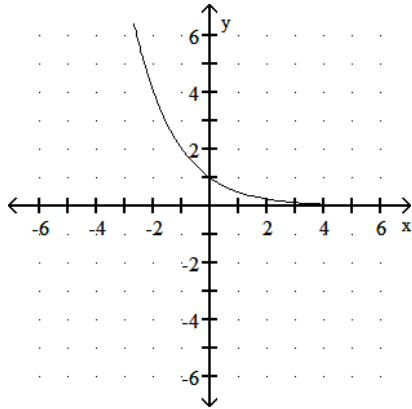
Graph the exponential function.

14)  $y = \left(\frac{1}{2}\right)^x$

14) \_\_\_\_\_



Answer:



MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find the equation of the hyperbola satisfying the given conditions. The center is at the origin.

15) Vertex (2, 0), focus (3, 0)

15) \_\_\_\_\_

A)  $\frac{x^2}{4} - \frac{y^2}{5} = 1$

B)  $\frac{x^2}{5} - \frac{y^2}{4} = 1$

C)  $\frac{x^2}{9} - \frac{y^2}{4} = 1$

D)  $\frac{x^2}{4} - \frac{y^2}{9} = 1$

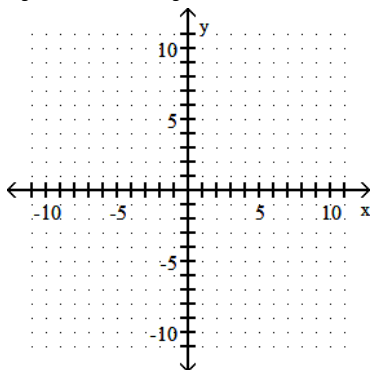
Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

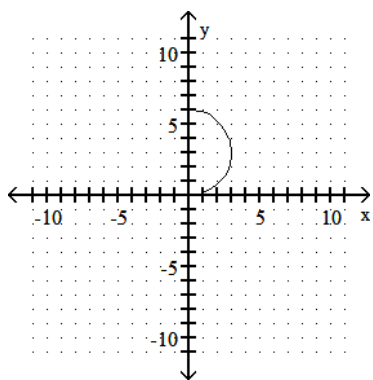
Sketch the curve.

16)  $9y^2 + 9x^2 + 54y = 0$

16) \_\_\_\_\_

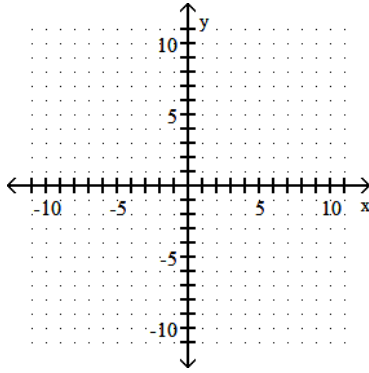


Answer:

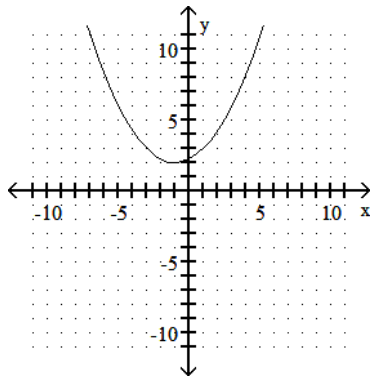


17)  $x^2 + 2x - 4y + 9 = 0$

17) \_\_\_\_\_

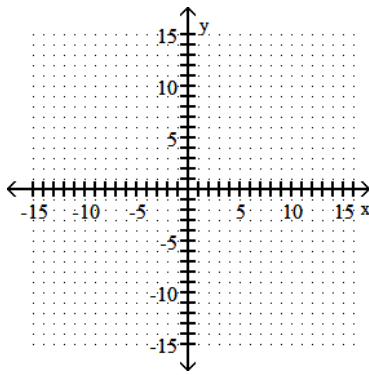


Answer:

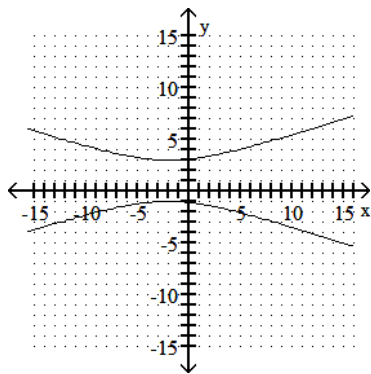


18)  $\frac{(y - 1)^2}{4} - \frac{(x + 2)^2}{36} = 1$

18) \_\_\_\_\_



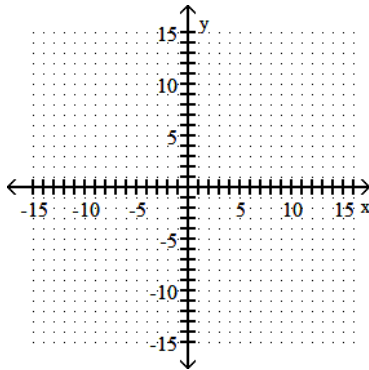
Answer:



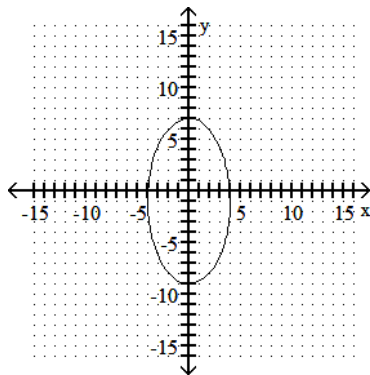
MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

19)  $\frac{x^2}{16} + \frac{(y+1)^2}{64} = 1$

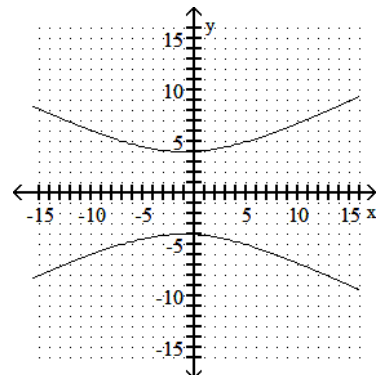
19) \_\_\_\_\_



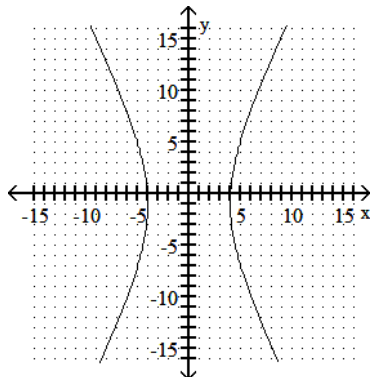
A)



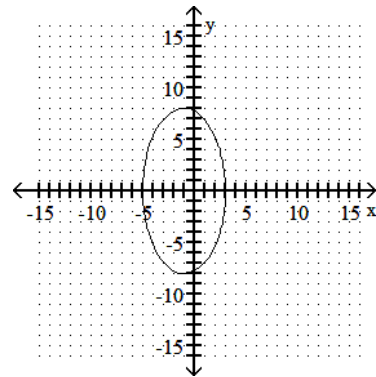
B)



C)



D)



Answer: A

Evaluate the limit by direct evaluation. Change the form of the function where necessary.

20)  $\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{x - 2}$

20) \_\_\_\_\_

A) 8

B) Does not exist

C) 4

D) 0

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

21)  $\lim_{x \rightarrow 3} \frac{3t^2 - 9t}{t - 3}$

21) \_\_\_\_\_

Answer: 9

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find the slope of the line tangent to the curve at the given value of x.

22)  $f(x) = x^3 - 6x$ ;  $x = -4$

A) 10

B) 42

C) 72

D) 48

22) \_\_\_\_\_

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Find the derivative of the function by using the definition.

23)  $y = 2x^2 + 5x$

23) \_\_\_\_\_

Answer:  $4x + 5$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

24)  $y = 5x^2 + 2$

A)  $10x^2 + 2$

B)  $10x + 2$

C)  $10x$

D)  $5x$

24) \_\_\_\_\_

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Find the derivative.

25)  $f(x) = x^8 - 3x^6 - 4x^5 + x$

25) \_\_\_\_\_

Answer:  $8x^7 - 18x^5 - 20x^4 + 1$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find the slope of the line tangent to the graph of the function at the given value of x.

26)  $y = x^2 - 6x - 2$ ;  $x = -1$

A) -8

B) -6

C) -10

D) -2

26) \_\_\_\_\_

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

27)  $y = x^3 - 9x - 3$ ;  $x = 3$

27) \_\_\_\_\_

Answer: 18

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find the derivative of the function.

28)  $f(x) = (x^2 - 3x + 2)(2x^3 - x^2 + 5)$

28) \_\_\_\_\_

A)  $2x^4 - 28x^3 + 21x^2 + 6x - 15$

B)  $10x^4 - 24x^3 + 21x^2 + 6x - 15$

C)  $10x^4 - 28x^3 + 21x^2 + 6x - 15$

D)  $2x^4 - 24x^3 + 21x^2 + 6x - 15$

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

29)  $f(x) = \frac{9x - 1}{x^2 - 5x + 7}$

29) \_\_\_\_\_

Answer:  $\frac{-9x^2 + 2x + 58}{(x^2 - 5x + 7)^2}$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find  $dy/dx$  by implicit differentiation. If applicable, express the result in terms of  $x$  and  $y$ .

30)  $x^2y^4 + 7y = 5x - 3$

30) \_\_\_\_\_

A)  $\frac{5 - 2xy^4}{7 + 4x^2y^3}$

B)  $\frac{5 - 2xy^4}{7}$

C)  $\frac{5 - 7y - 2xy^4}{4x^2y^3}$

D)  $\frac{5 - 2xy^4}{7 + x^2}$

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

31)  $3y^3 - y = 9 - x^4$

31) \_\_\_\_\_

Answer:  $\frac{-4x^3}{9y^2 - 1}$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find an equation for the line tangent to the given curve at the indicated point.

32)  $y = \frac{6x}{x^2 + 1}$  at  $(1, 3)$ .

32) \_\_\_\_\_

A)  $y = x + 3$

B)  $y = 3$

C)  $y = 3x$

D)  $y = 0$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

33)  $y = \frac{18}{x^2 + 2}$  at  $(1, 6)$ .

33) \_\_\_\_\_

Answer:  $y = -4x + 10$



MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Solve the problem.

- 34) A ladder is slipping down a vertical wall. If the ladder is 20 ft long and the top of it is slipping at the constant rate of 3 ft/s, how fast is the bottom of the ladder moving along the ground when the bottom is 16 ft from the wall? 34) \_\_\_\_\_

A) 2.3 ft/s                      B) 0.19 ft/s                      C) 3.8 ft/s                      D) 0.8 ft/s

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

- 35) A metal cube dissolves in acid such that an edge of the cube decreases by 0.42 mm/min. How fast is the volume of the cube changing when the edge is 6.8 mm? 35) \_\_\_\_\_

Answer:  $-58 \text{ mm}^3/\text{min}$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find the indicated root of the given quadratic equation by finding  $x_3$  from Newton's method (choose  $x_0$  to be the midpoint of the given interval).

- 36)  $x^2 - 2x - 1 = 0$  (between -1 and 0) 36) \_\_\_\_\_  
A) -0.4142157                      B) 2.4142157                      C) 2.4142136                      D) -0.4142136

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

- 37)  $7x^2 + 5x - 3 = 0$  (between 0 and 1) 37) \_\_\_\_\_

Answer: 0.3885933

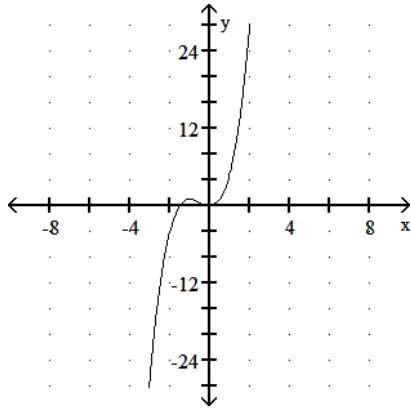
MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Sketch the graph and show all relative extrema and inflection points.

38)  $y = 2x^3 - 12x^2 + 18x$

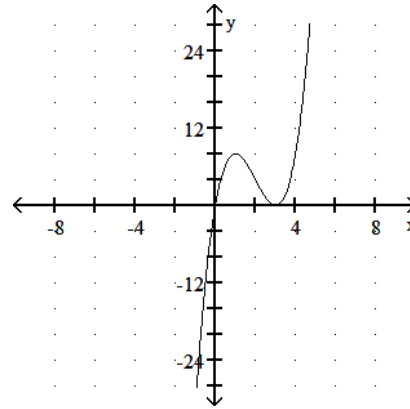
38) \_\_\_\_\_

A)



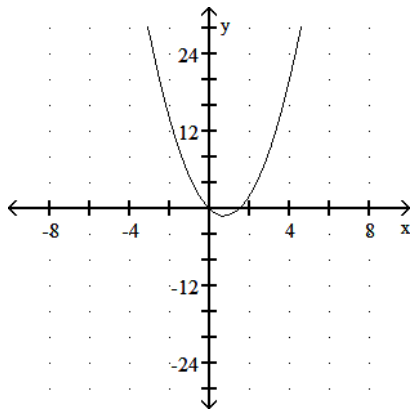
Relative maximum: (0,0)  
Relative minimum: (1,-1)  
Inflection point: (0.5,-0.5)

B)



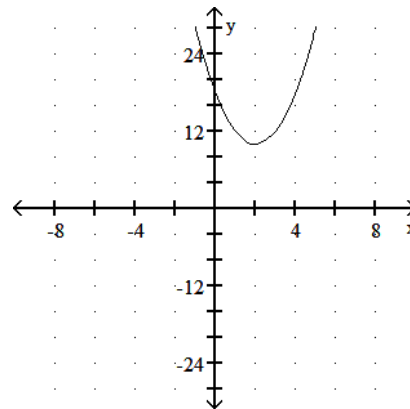
Relative maximum: (1,8)  
Relative minimum: (3,0)  
Inflection point: (2,4)

C)



No extrema  
Inflection point: (0,0)

D)



Relative minimum: (2,10)  
No inflection point

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Solve the problem.

39) From a thin piece of cardboard 50 in. by 50 in., square corners are cut out so that the sides can be folded up to make a box. What dimensions will yield a box of maximum volume? What is the maximum volume? Round to the nearest tenth, if necessary.

39) \_\_\_\_\_

Answer: 33.3 in. by 33.3 in. by 8.3 in.; 9259.3 in.<sup>3</sup>

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

- 40) A company wishes to manufacture a box with a volume of 24 cubic feet that is open on top and is twice as long as it is wide. Find the width of the box that can be produced using the minimum amount of material. Round to the nearest tenth, if necessary. 40) \_\_\_\_\_
- A) 5.2 ft                      B) 6.4 ft                      C) 2.6 ft                      D) 3.2 ft

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Find the linearization  $L(x)$  of the given function for the given value of  $a$ .

41)  $f(x) = \sqrt[3]{x}$ ,  $a = 8$  41) \_\_\_\_\_

Answer:  $L(x) = \frac{x}{12} + \frac{4}{3}$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Use the linearization of the function to approximate the value of the function. Give your answer in the form indicated.

- 42)  $\sqrt{78}$  42) \_\_\_\_\_
- Give your answer as a decimal. Round to 4 decimal places if necessary.
- A) 6.0000                      B) 9.1667                      C) 8.6667                      D) 8.8333

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Find an antiderivative of the given function.

43)  $f(x) = 5\sqrt{x} + 8$  43) \_\_\_\_\_

Answer:  $\frac{10}{3}x^{3/2} + 8x$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find the exact area under the curve between the indicated values of  $x$ .

- 44)  $y = x^2 + 1$ ; between  $x = 0$  and  $x = 1$  44) \_\_\_\_\_
- A)  $\frac{5}{3}$                       B)  $\frac{4}{3}$                       C)  $\frac{1}{3}$                       D)  $\frac{2}{3}$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

- 45)  $y = 2x - x^2$ ; between  $x = 0$  and  $x = 2$  45) \_\_\_\_\_

Answer:  $\frac{4}{3}$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Integrate the given expression.

46)  $\int 4x^3(x^4 + 1)^3 dx$  46) \_\_\_\_\_

A)  $\frac{(x^4 + 1)^4}{4} + 4x + C$

B)  $\frac{(x^4 + 1)^4}{4} + C$

C)  $\frac{(x^3 + 1)^3}{3} + C$

D)  $4x + C$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

47)  $\int x^3 \sqrt{x^4 + 3} dx$  47) \_\_\_\_\_

Answer:  $\frac{1}{6}(x^4 + 3)^{3/2} + C$

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

Find an approximate value for the integral, using the trapezoidal rule with n intervals. Round the answer to the nearest tenth if necessary.

48)  $\int_1^3 \frac{8}{x^2} dx, n = 4$  48) \_\_\_\_\_

A)  $\frac{282}{25}$

B)  $\frac{141}{25}$

C)  $\frac{141}{50}$

D)  $\frac{142}{25}$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.  
SHOW ALL YOUR WORK.

Evaluate the definite integral.

49)  $\int_{-4}^0 \frac{11}{8} x^3 dx$  49) \_\_\_\_\_

Answer: - 88

MULTIPLE CHOICE. Choose and CIRCLE one alternative that best answers the question.

50)  $\int_0^3 \sqrt{3x} dx$  50) \_\_\_\_\_

A) 9

B)  $\frac{27}{2}$

C) 6

D) 3

Answer: C