

Tan.ApplCalcBrf9-ch01sec01

Student: _____

$$-\frac{5}{6} < -\frac{11}{12}$$

1.
True False

2. Suppose a and b are real numbers other than zero and that $a < b$. State whether the inequality is true or false.

$$\frac{1}{a} < \frac{1}{b}$$

True False

3. Determine whether the statement below is true for all real numbers b .

$$|b + 8| = |b| + 8$$

True False

4. If $a > b$, then $a - c < b - c$.

True False

5. A manufacturer of a certain commodity has estimated that her profit in thousands of dollars is given by the expression

$$-4x^2 + 28x - 6$$

where x (in thousands) is the number of units produced.

What production range will enable the manufacturer to realize a profit of at least \$18,000 on the commodity?

- A. Between 4,000 and 9,000 units.
- B. Between 4,000 and 6,000 units.
- C. Between 1,000 and 6,000 units.
- D. Between 1,000 and 8,000 units.
- E. Between 1,000 and 9,000 units.

6. Rationalize the numerator of the expression.

$$\sqrt{\frac{3y}{x}}$$

$$\frac{3}{\sqrt{xy^2}}$$

A.

$$\frac{3y}{\sqrt{xy^2}}$$

B.

$$\frac{3y}{\sqrt{xy}}$$

C.

$$\frac{3y}{\sqrt{3xy}}$$

D.

$$\frac{3y}{\sqrt{3xy^2}}$$

E.

7. Rationalize the denominator of the expression.

$$\frac{y}{\sqrt{5x}}$$

$$\frac{\sqrt{5xy}}{5x}$$

A.

$$\frac{y\sqrt{x}}{5x}$$

B.

$$\frac{y\sqrt{5x}}{5x}$$

C.

$$\frac{y\sqrt{5x}}{5x^2}$$

D.

$$\frac{y\sqrt{5}}{5x}$$

E.

$$10^{\frac{1}{2}} \approx 3.162$$

8. Use the fact that _____ to evaluate the expression without using a calculator.

$$10^{3.5}$$

- A. 3.162
- B. 31.62
- C. 3,162
- D. 31,620
- E. 316,200

$$10^{\frac{1}{4}} \approx 1.778$$

9. Use the fact that _____ to evaluate the expression without using a calculator.

$$10^{1.25}$$

- A. 1.778
- B. 0.01778
- C. 178
- D. 17.78
- E. 1,778

10. Simplify the expression. (Assume that r , s , and t are positive.)

$$\sqrt[3]{8r^6} \sqrt{s^4 t^6}$$

$$2r^2 s^6 t^4$$

A.

$$8r^2 s^2 t^3$$

B.

$$2r^2 s^2 t^3$$

C.

$$2r^3 s^6 t^3$$

D.

$$8r^2 s^4 t^4$$

E.

11. Evaluate the expression.

$$\left[\left(-\frac{1}{4} \right)^3 \right]^{-2}$$

A. 4,096

B. -1,024

C. -6,561

D. 6,561

E. -4,096

12. Determine whether the statement is true or false.

$$\frac{4^{3/2}}{2^6} = \frac{1}{2}$$

A. False

B. True

13. Determine whether the statement is true or false.

$$-\frac{7}{8} > -\frac{15}{16}$$

- A. True
- B. False

14. Show the interval $[6, 8)$ on a number line.



A.



B.



C.



D.



E.

15. Evaluate the expression.

$$\left| 3\sqrt{2} - 2 \right| + \left| 8 - 3\sqrt{2} \right|$$

$$3\sqrt{2}$$

A.

$$6\sqrt{2}$$

B.

$$6$$

C.

$$-6\sqrt{2}$$

D.

$$-6$$

E.

16. Evaluate the expression.

$$\left| \sqrt{3} - 1 \right| + \left| 8 + \sqrt{3} \right|$$

$$7 + 2\sqrt{3}$$

A.

$$2\sqrt{3}$$

B.

$$9 + 2\sqrt{3}$$

C.

$$-2\sqrt{3}$$

D.

$$7 - 2\sqrt{3}$$

E.

17. Suppose a and b are real numbers other than zero and that $a > b$. State whether the inequality is true or false.

$$\frac{1}{a} > \frac{1}{b}$$

- A. False
- B. True

18. Evaluate the expression.

$$\frac{81^{\frac{3}{8}} 81^{\frac{1}{2}}}{81^{\frac{5}{8}}}$$

$$\frac{1}{27}$$

- A.
- B. 1
- C. 3
- D. 9
- $\frac{1}{3}$

E.

19. Rewrite the expression using positive exponents only.

$$\sqrt{x^{-1}} \cdot \sqrt{4x^{-7}}$$

$$2x^4$$

A.

$$4x^8$$

B.

$$\frac{2}{x^8}$$

C.

$$\frac{4}{x^4}$$

D.

$$\frac{2}{x^4}$$

E.

20. Simplify the expression. (Assume x and y are positive.)

$$\sqrt{81x^{10}y^{-6}}$$

$$9\frac{x^5}{y^3}$$

A.

$$81\frac{x^5}{y^3}$$

B.

$$81x^5y^3$$

C.

$$9\frac{y^3}{x^5}$$

D.

$$9x^5y^3$$

E.

21. Determine whether the statement below is true for positive real numbers a .

$$|a + 8| = |a| + 8$$

A. True

B. False

22. Rationalize the denominator of the expression.

$$\sqrt{\frac{3x}{y}}$$

$$\frac{\sqrt{3(x+y)}}{y}$$

A.

$$\frac{\sqrt{3xy}}{x}$$

B.

$$3\frac{\sqrt{xy}}{y}$$

C.

$$\frac{\sqrt{3(x-y)}}{y}$$

D.

$$\frac{\sqrt{3xy}}{y}$$

E.

23. Rationalize the numerator of the expression.

$$\frac{\sqrt[7]{x^5 z^5}}{6y}$$

$$\frac{xyz}{6\sqrt[7]{x^2 y z^2}}$$

A.

$$\frac{7xz}{6y\sqrt[7]{x^2 z^2}}$$

B.

$$\frac{xyz}{6\sqrt[7]{x^2 z^2}}$$

C.

$$\frac{xz}{6y\sqrt[7]{x^5 z^5}}$$

D.

$$\frac{xz}{6y\sqrt[7]{x^2 z^2}}$$

E.

24. Find the maximum profit P (in dollars) given that

$$8(P - 2,300) \leq 6(P + 2,000)$$

A. \$ 15,650

B. \$ 7,600

C. \$ 15,200

D. \$ 16,100

E. \$ 22,800

25. Find the minimum profit P (in dollars) given that

$$5(P - 2,700) \geq 3(P - 1,800)$$

- A. \$ 4,450
- B. \$ 4,550
- C. \$ 4,050
- D. \$ 3,850
- E. \$ 4,250

26. A salesman's monthly commission is 15% on all sales over \$11,000. If his goal is to make a commission of at least \$2,400/month, what minimum monthly sales figures must he attain?

- A. \$ 13,400
- B. \$ 12,200
- C. \$ 15,800
- D. \$ 24,600
- E. \$ 27,000

27. Simplify the expression.

$$\frac{5x^9y^3}{4xy^6}$$

$$\frac{5x^9}{4y^3}$$

A.

$$\frac{5x^8}{4y^4}$$

B.

$$\frac{5x^8}{4y^3}$$

C.

$$\frac{5y^3}{4x^8}$$

D.

$$\frac{4x^8}{5y^3}$$

E.

28. The diameter x (in inches) of a batch of ball bearings manufactured by PAR Manufacturing satisfies the inequality

$$|x - 0.45| \leq 0.02$$

What is the smallest diameter a ball bearing in the batch can have?

- A. 0.4 inches
- B. 0.46 inches
- C. 0.47 inches
- D. 0.43 inches
- E. 0.45 inches

29. Evaluate the expression.

$$\frac{|-12 + 10|}{|10 - 8|}$$

- A. 1
- B. 9
- C. 6
- D. 8
- E. 4

30. Determine whether the statement is true or false.

If $a < b$, then $a - c > b - c$.

- A. True
- B. False

31. Find the values of x that satisfy the inequalities.

$$x - 3 \leq 3 \quad x + 7 > 1$$

and

$$(-\infty, -6] \cup (6, \infty)$$

- A.
[-6, 6)
- B.
 $(-\infty, -6) \cup [6, \infty)$
- C.
 $(-\infty, 6]$
- D.
 $(-6, 6]$
- E.

32. Find the values of x that satisfy the inequalities.

$$x - 6 > 3 \quad x + 4 \leq 3$$

and

$$(-1, 9]$$

A.

$$(-\infty, -1) \cup [9, \infty)$$

B.

$$(-\infty, -1] \cup (9, \infty)$$

C.

$$(-\infty, 9]$$

D.

$$[-1, 9)$$

E.

33. Evaluate the expression.

$$\sqrt[3]{7^6}$$

$$\frac{1}{49}$$

A.

$$49$$

B.

$$\frac{1}{7}$$

C.

$$2,187$$

D.

$$7$$

E.

34. Simplify the expression.

$$\frac{x^{\frac{8}{3}}}{x^{-2}}$$

A. x^3

B. $x^{\frac{3}{14}}$

C. $x^{-\frac{14}{3}}$

D. $x^{-\frac{3}{14}}$

E. $x^{\frac{14}{3}}$

$$3^{\frac{1}{2}} \approx 1.732$$

35. Use the fact that the $3^{\frac{1}{2}} \approx 1.732$ to evaluate the expression without using a calculator.

$$3^{\frac{5}{2}}$$

Round the answer to the nearest thousandth.

A. 15.588

B. 43.075

C. 5.196

D. 46.765

E. 24.994

36. Evaluate the expression.

$$\left[\left(-\frac{1}{2} \right)^2 \right]^{-3}$$

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37. Use the fact that _____ to evaluate the expression without using a calculator.

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38. Evaluate the expression.

$$\left| \sqrt{2} - 1 \right| + \left| 7 - \sqrt{2} \right|$$

39. Evaluate the expression.

$$\frac{16^{-\frac{3}{8}} 16^{\frac{1}{4}}}{16^{-\frac{1}{8}}}$$

40. Find the maximum profit P (in dollars) given that

$$11(P - 2,500) \leq 9(P + 2,400)$$

\$ _____

41. A salesman's monthly commission is 15% on all sales over \$15,000. If his goal is to make a commission of at least \$3,300/month, what minimum monthly sales figures must he attain?

\$ _____

42. The diameter x (in inches) of a batch of ball bearings manufactured by PAR Manufacturing satisfies the inequality

$$|x - 0.1| \leq 0.04$$

What is the largest diameter a ball bearing in the batch can have? Give your answer to two decimal places, if necessary.

_____ inches

43. Evaluate the expression.

$$\frac{|-18 + 16|}{|13 - 11|}$$

$$2^{\frac{1}{2}} \approx 1.414$$

44. Use the fact that the _____ to evaluate the expression without using a calculator.

$$2^{\frac{7}{2}}$$

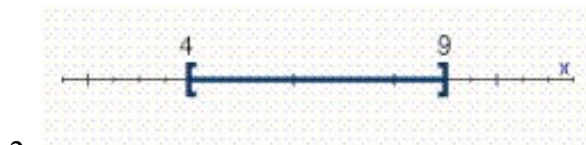
Round the answer to the nearest thousandth, if necessary.

45. Match each interval with the corresponding number line.

Choose the correct letter for each question.



$(-6, \infty)$ _____



$(4, 9)$ _____



$(-\infty, 6]$ _____



$[4, 9]$ _____

46. Match each pair of inequalities with the corresponding values of x .

Choose the correct letter for each question.

- | | |
|-------------------------------------|---|
| 1. $(-2, 8]$ | $x - 3 \leq 5$ and $x + 5 \geq 3$ _____ |
| 2. $[-2, 8]$ | $x - 3 > 5$ and $x + 5 \leq 3$ _____ |
| 3. $(-\infty, -2] \cup (8, \infty)$ | $x - 3 \geq 5$ and $x + 5 \leq 3$ _____ |
| 4. $(-\infty, -2] \cup [8, \infty)$ | $x - 3 \leq 5$ and $x + 5 > 3$ _____ |

47. Simplify the expression. (Assume that r , s , and t are positive.)

$$\sqrt[3]{64r^6} \sqrt{s^8t^4}$$

48. Rationalize the numerator of the expression.

$$\sqrt[3]{\frac{2y}{x}}$$

49. Rewrite the expression using positive exponents only.

$$\sqrt{x^{-1}} \cdot \sqrt{9x^{-9}}$$

50. Simplify the expression. (Assume x and y are positive.)

$$\sqrt{36x^{12}y^{-10}}$$

51. Rationalize the denominator of the expression.

$$\sqrt{\frac{13x}{y}}$$

52. Rationalize the numerator of the expression.

$$\frac{\sqrt[7]{x^5 z^2}}{9y}$$

53. Simplify the expression.

$$\frac{3x^9 y^3}{4x y^9}$$

54. Evaluate the expression.

$$\sqrt[3]{3^9}$$

55. Simplify the expression.

$$\frac{x^{\frac{4}{3}}}{x^{-2}}$$

56. A manufacturer of a certain commodity has estimated that her profit in thousands of dollars is given by the expression

$$-4x^2 + 28x - 10$$

where x (in thousands) is the number of units produced.

What production range will enable the manufacturer to realize a profit of at least \$14,000 on the commodity?

Between _____ and _____ units.

57. Determine whether the statement is *true* or *false*.

$$\frac{4^{\frac{3}{2}}}{2^6} = \frac{1}{2}$$

Tan.ApplCalcBrf9-ch01sec01 Key

$$-\frac{5}{6} < -\frac{11}{12}$$

1.

FALSE

2. Suppose a and b are real numbers other than zero and that $a < b$. State whether the inequality is true or false.

$$\frac{1}{a} < \frac{1}{b}$$

FALSE

3. Determine whether the statement below is true for all real numbers b .

$$|b + 8| = |b| + 8$$

FALSE

4. If $a > b$, then $a - c < b - c$.

FALSE

5. A manufacturer of a certain commodity has estimated that her profit in thousands of dollars is given by the expression

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where x (in thousands) is the number of units produced.

What production range will enable the manufacturer to realize a profit of at least \$18,000 on the commodity?

- A. Between 4,000 and 9,000 units.
- B. Between 4,000 and 6,000 units.
- C.** Between 1,000 and 6,000 units.
- D. Between 1,000 and 8,000 units.
- E. Between 1,000 and 9,000 units.

6. Rationalize the numerator of the expression.

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A.

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7. Rationalize the denominator of the expression.

$$\frac{y}{\sqrt{5x}}$$

$$\frac{\sqrt{5xy}}{5x}$$

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$$\frac{y\sqrt{5x}}{5x^2}$$

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E.

$$10^{\frac{1}{2}} \approx 3.162$$

8. Use the fact that _____ to evaluate the expression without using a calculator.

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11. Evaluate the expression.

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A.



B.



C.



D.



E.

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$$\left| 3\sqrt{2} - 2 \right| + \left| 8 - 3\sqrt{2} \right|$$

$$3\sqrt{2}$$

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E.

19. Rewrite the expression using positive exponents only.

$$\sqrt{x^{-1}} \cdot \sqrt{4x^{-7}}$$

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$$\frac{xyz}{6\sqrt[7]{x^2 y z^2}}$$

A.

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B.

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- E. \$

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$$x - 3 \leq 3 \quad x + 7 > 1$$

and

$$(-\infty, -6] \cup (6, \infty)$$

- A.
[-6, 6)
- B.
 $(-\infty, -6) \cup [6, \infty)$
- C.
 $(-\infty, 6]$
- D.
 $(-6, 6]$
- E.**

32. Find the values of x that satisfy the inequalities.

$$x - 6 > 3 \quad x + 4 \leq 3$$

and

$$(-1, 9]$$

A.

$$(-\infty, -1) \cup [9, \infty)$$

B.

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C.

$$(-\infty, 9]$$

D.

$$[-1, 9)$$

E.

33. Evaluate the expression.

$$\sqrt[3]{7^6}$$

$$\frac{1}{49}$$

A.

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$$2,187$$

D.

$$7$$

E.

34. Simplify the expression.

$$\frac{x^{\frac{8}{3}}}{x^{-2}}$$

A. x^3

B. $x^{\frac{3}{14}}$

C. $x^{-\frac{14}{3}}$

D. $x^{-\frac{3}{14}}$

E. $x^{\frac{14}{3}}$

E.

$$3^{\frac{1}{2}} \approx 1.732$$

35. Use the fact that the $3^{\frac{1}{2}} \approx 1.732$ to evaluate the expression without using a calculator.

$$3^{\frac{5}{2}}$$

Round the answer to the nearest thousandth.

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3,162

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$$\left| \sqrt{2} - 1 \right| + \left| 7 - \sqrt{2} \right|$$

6

39. Evaluate the expression.

$$\frac{16^{-\frac{3}{8}} 16^{\frac{1}{4}}}{16^{-\frac{1}{8}}}$$

1

40. Find the maximum profit P (in dollars) given that

$$11(P - 2,500) \leq 9(P + 2,400)$$

\$ _____
24,550

41. A salesman's monthly commission is 15% on all sales over \$15,000. If his goal is to make a commission of at least \$3,300/month, what minimum monthly sales figures must he attain?

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37,000

42. The diameter x (in inches) of a batch of ball bearings manufactured by PAR Manufacturing satisfies the inequality

$$|x - 0.1| \leq 0.04$$

What is the largest diameter a ball bearing in the batch can have? Give your answer to two decimal places, if necessary.

_____ inches
0.14

43. Evaluate the expression.

$$\frac{|-18 + 16|}{|13 - 11|}$$

1

$$2^{\frac{1}{2}} \approx 1.414$$

44. Use the fact that the _____ to evaluate the expression without using a calculator.

$$2^{\frac{7}{2}}$$

Round the answer to the nearest thousandth, if necessary.

11.312

45. Match each interval with the corresponding number line.

Choose the correct letter for each question.



$(-6, \infty)$ 3



$(4, 9)$ 4



$(-\infty, 6]$ 1



$[4, 9]$ 2

46. Match each pair of inequalities with the corresponding values of x .

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| 3. $(-\infty, -2] \cup (8, \infty)$ | $x - 3 \geq 5$ and $x + 5 \leq 3$ <u>4</u> |
| 4. $(-\infty, -2] \cup [8, \infty)$ | $x - 3 \leq 5$ and $x + 5 > 3$ <u>1</u> |

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$$\sqrt[3]{64r^6} \sqrt{s^8t^4}$$

$$4r^2s^4t^2$$

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$$\frac{\sqrt[7]{x^5 z^2}}{9y}$$

$$\frac{xz}{9y\sqrt[7]{x^2 z^5}}$$

53. Simplify the expression.

$$\frac{3x^9 y^3}{4x y^9}$$

$$\frac{3x^8}{4y^6}$$

54. Evaluate the expression.

$$\sqrt[3]{3^9}$$

$$3^3$$

55. Simplify the expression.

$$\frac{x^{\frac{4}{3}}}{x^{-2}}$$

$$x^{\frac{10}{3}}$$

56. A manufacturer of a certain commodity has estimated that her profit in thousands of dollars is given by the expression

$$-4x^2 + 28x - 10$$

where x (in thousands) is the number of units produced.

What production range will enable the manufacturer to realize a profit of at least \$14,000 on the commodity?

Between _____ and _____ units.

1,000; 6,000

57. Determine whether the statement is *true* or *false*.

$$\frac{4^{\frac{3}{2}}}{2^6} = \frac{1}{2}$$

false