Intermediate Algebra
Final Review

Use scantron form no. 882–E

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

Solve the problem.

1) An object is thrown upward from the top of a 160–foot building with an initial velocity of 48 feet per second. The height h of the object after t seconds is given by the quadratic equation $h = -16t^2 + 48t + 160$. When will the object hit the ground? 1) _____

A) 2 sec B) 160 sec C) 5 sec D) –2 sec

Factor completely, or state that the polynomial is prime.

2) $x^5 + 11x^4 + 30x^3$ 2) _____

A) $x^3(x + 5)(x + 6)$ B) $x^3(x + 5)(x - 6)$

C) $x^5(x^2 + 11x + 30)$ D) $x^3(x - 5)(x + 6)$

Solve the problem.

3) The width of a rectangle is 6 kilometers less than twice its length. If its area is 176 square kilometers, find the dimensions of the rectangle. 3) _____

A) length = 11 km, width = 16 km B) width = 11 km, length = 16 km

C) length = 3 km, width = $\frac{176}{3}$ km D) length = 8 km, width = 10 km

Solve the quadratic equation.

4) $(x + 4)(x + 1) = 54$ 4) _____

A) {–10, 5} B) {–5, 10} C) {1, 4} D) {–4, –1}

Factor completely, or state that the polynomial is prime.

5) $x^3 - x^2 + 6x - 6$ 5) _____

A) $(x^2 + 6)(6x - 1)$ B) $(x^2 + 6)(x - 1)$ C) $(x^2 - 6)(x - 1)$ D) $(x^2 - 1)(x + 6)$

6) $x^3 - x^2 - 56x$ 6) _____

A) $x(x + 7)(x - 8)$ B) prime C) $x(x + 8)(x - 7)$ D) $(x^2 + 1)(x - 56)$

7) $32x^3 + 0x^2 - 2x$ 7) _____

A) $2x(4x - 1)(4x + 1)$ B) $x(4x - 1)(8x + 2)$

C) $x(8x - 2)(4x + 1)$ D) $2(4x^2 - 1)(4x + 1)$

Find all values that make the rational expression undefined. If the rational expression is defined for all real numbers, so state.

8) $\frac{x^2 - 4}{x^2 - 11x + 18}$ 8) _____

A) x = 2, x = –2 B) x = –2, x = –9 C) x = 2, x = 9 D) x = 0

Perform the indicated operation. Simplify if possible.

9) $\frac{x^2-2x}{x^2-4} \div \frac{x+3}{x^2+5x+6}$ 9) _____

A) $\frac{x}{(x+2)(x+2)}$ B) x C) $\frac{1}{x}$ D) $-x$

10) $\frac{14}{3x-18} + \frac{x}{x^2-36}$ 10) _____

A) $\frac{17x}{(x+6)(x-6)}$ B) $\frac{17x+84}{3(x+6)(x-6)}$ C) $\frac{x+14}{3(x+6)(x-6)}$ D) $\frac{15x+84}{(x+6)(x-6)}$

Simplify the complex rational expression.

11) $\frac{\frac{5}{x}-\frac{3}{y}}{\frac{2}{x}+\frac{5}{y}}$ 11) _____

A) $\frac{5y-3x}{2y+5x}$ B) $\frac{5x-3y}{2x+5y}$ C) $\frac{5y+3x}{2y-5x}$ D) $\frac{2(x+y)}{7(x-y)}$

Perform the indicated operation. Simplify if possible.

12) $\frac{4}{x^2-3x+2} + \frac{7}{x^2-1}$ 12) _____

A) $\frac{56x-10}{(x-1)(x+1)(x-2)}$ B) $\frac{11x-10}{(x-1)(x-2)}$

C) $\frac{10x-11}{(x-1)(x+1)(x-2)}$ D) $\frac{11x-10}{(x-1)(x+1)(x-2)}$

Solve the problem.

13) A painter can finish painting a house in 8 hours. Her assistant takes 10 hours to finish the same job. How long would it take for them to complete the job if they were working together? 13) _____

A) 9 hr B) 7 hr C) $\frac{9}{40}$ hr D) $4\frac{4}{9}$ hr

Perform the indicated operation. Simplify if possible.

14) $\frac{7}{x+9} + 4$ 14) _____

A) $\frac{4x+43}{x+9}$ B) $\frac{11}{x+9}$ C) $\frac{4x+99}{x+9}$ D) $\frac{4x+29}{x+9}$

15) $\frac{t^2 - b^2}{t + b} \div \frac{t}{t^2 + tb}$ 15) _____

A) $t - b$ B) $-\frac{1}{t}$ C) t D) $(t + b)(t - b)$

16) $\frac{x - 6}{7} \cdot \frac{28}{x^2 - 36}$ 16) _____

A) $4(x + 6)$ B) $\frac{x - 6}{4}$ C) $\frac{4}{x + 6}$ D) $\frac{4}{x - 6}$

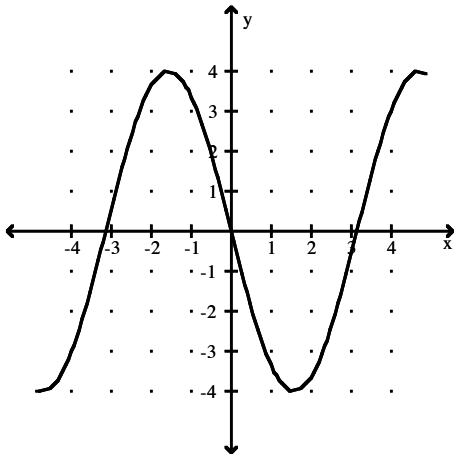
Given f(x) and g(x), find the following.

17) $f(x) = x^2 + 2x$ and $g(x) = x + 7$. Find $(f\ g)(2)$. 17) _____

A) 99 B) 36 C) 54 D) 72

Use the graph of f to solve.

18) Find f(–4) 18) _____



A) –3 B) –1.6 C) 1.6 D) 3

Given f(x) and g(x), find the following.

19) $f(x) = x^2 + 7x$ and $g(x) = x - 4$. Find $\left(\frac{f}{g}\right)(x)$ and $\left(\frac{f}{g}\right)(-1)$. 19) _____

A) $\frac{x^2 + 7x}{x - 4}; \frac{3}{2}$ B) $\frac{x^2 + 7x}{x - 4}; \frac{6}{5}$ C) $\frac{x^2 + 7x}{x - 4}; -\frac{3}{2}$ D) $\frac{x + 7}{-4}; -\frac{3}{2}$

Determine whether the relation is a function. Give domain and range of the relation.

20) {(–1, –2), (–1, –1), (–1, 0), (0, 1), (8, 3)} 20) _____

A) function
domain: {–1, 0, –1, 8}
range: {–2, –1, 0, 1, 3}

B) function
domain: {–2, –1, 0, 1, 3}
range: {–1, 0, –1, 8}

C) not a function
domain: {–1, 0, –1, 8}
range: {–2, –1, 0, 1, 3}

D) not a function
domain: {–2, –1, 0, 1, 3}
range: {–1, 0, –1, 8}

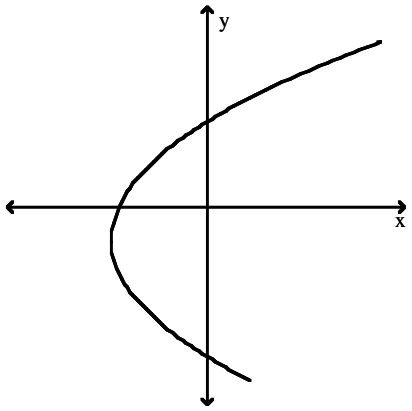
Evaluate the function.

21) If $f(x) = x^2 - 5x - 7$, find $f(-3)$. 21) _____

A) 17 B) –13 C) 1 D) 31

Determine if the graph represents y as a function of x.

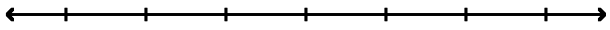
22) 22) _____



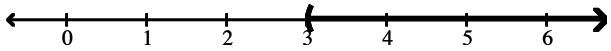
A) Function B) Not a function

Solve and graph the solution set on a number line. Express the solution set in both set–builder and interval notations.

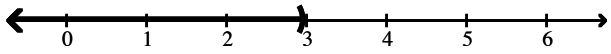
23) $5(3x - 1) < 20x - 20$ 23) _____



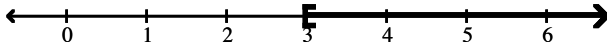
A) $\{x \mid x > 3\}$; $(3, \infty)$



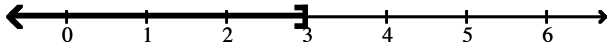
B) $\{x \mid x < 3\}$; $(-\infty, 3)$



C) $\{x \mid x \geq 3\}$; $[3, \infty)$



D) $\{x \mid x \leq 3\}$; $(-\infty, 3]$



Find the solution set for the equation.

24) $|-9x - 5| = |7 + 2x|$ 24) _____

A) $\varnothing$ B) $\left\{-\frac{12}{11}\right\}$ C) $\left\{-\frac{12}{11}, -\frac{2}{7}\right\}$ D) $\left\{-\frac{12}{11}, \frac{2}{7}\right\}$

Solve the problem.

25) A company is planning to manufacture copy machines. The fixed cost will be $30,000 and it will cost $7000 to produce each copier. Each copier will be sold for $12,000. 25) _____

a. Write the cost function, C. of producing x copiers.
b. Write the revenue function, R, from the sale of x copiers.
c. Write the profit function, P, from producing and selling x copiers.
d. More than how many copiers must be produced and sold to have a profit?

A) a. $C(x) = 7000x + 30{,}000$
b. $R(x) = 12{,}000x$
c. $P(x) = 5000x - 30{,}000$
d. 6 copiers

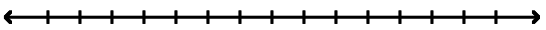
B) a. $C(x) = 7000x + 30{,}000$
b. $R(x) = 12{,}000x$
c. $P(x) = 5000x - 30{,}000$
d. 60 copiers

C) a. $C(x) = 7000x + 30{,}000$
b. $R(x) = 12{,}000x$
c. $P(x) = 5000x + 30{,}000$
d. 6 copiers

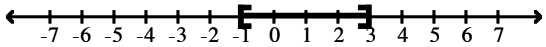
D) a. $C(x) = 12{,}000x + 30{,}000$
b. $R(x) = 7000x$
c. $P(x) = 5000x - 30{,}000$
d. 6 copiers

Solve the compound inequality. Except for the empty set, express the solution set in both set–builder and interval notations. Graph the solution set on a number line.

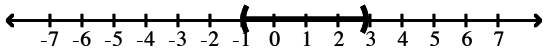
26) $7x + 5 < 26$ and $8x + 2 \geq -6$ 26) _____



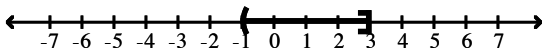
A) $\{x \mid -1 \leq x \leq 3\}$; $[-1, 3]$



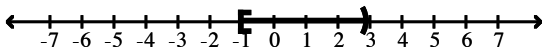
B) $\{x \mid -1 < x < 3\}$; $(-1, 3)$



C) $\{x \mid -1 < x \leq 3\}$; $(-1, 3]$



D) $\{x \mid -1 \leq x < 3\}$; $[-1, 3)$



Perform the indicated operation. Write the result in the form a + bi.

27) $\sqrt{-9} \cdot \sqrt{-9}$ 27) _____

A) $-9i$ B) -9 C) 9 D) $9i^2$

Simplify the expression. Assume that variables can represent any real number.

28) $\sqrt{x^2 - 14x + 49}$ 28) _____

A) $-|x - 7|$ B) $x - 7$ C) $|x - 7|$ D) $-x + 7$

Solve the radical equation.

29) $\sqrt{2x + 3} - \sqrt{x + 1} = 1$ 29) _____

A) $\{3, -1\}$ B) $\{-3, -1\}$ C) $\varnothing$ D) $\{3\}$

Simplify the expression. Assume that variables can represent any real number.

30) $\sqrt[3]{135x^5y^7}$ 30) _____

A) $3xy^2\sqrt[3]{5xy}$ B) $3x^3y^6\sqrt[3]{5x^2y}$ C) $3xy^2\sqrt[3]{5x^2y}$ D) $5xy^2\sqrt[3]{3xy}$

Rationalize the denominator. Simplify, if possible. Assume that any variables represent positive real numbers.

31) $\dfrac{\sqrt{11}+\sqrt{2}}{\sqrt{11}-\sqrt{2}}$ 31) _____

A) $\dfrac{13+2\sqrt{22}}{9}$ B) $\dfrac{125+2\sqrt{22}}{117}$ C) $\dfrac{13+2\sqrt{22}}{117}$ D) $\dfrac{125+2\sqrt{22}}{9}$

Perform the indicated operation and, if possible, simplify. Assume that all variables represent positive real numbers.

32) $\sqrt[4]{8x^3y} \cdot \sqrt[4]{6xy^2}$ 32) _____

A) $2x\sqrt[4]{3y^3}$ B) $x\sqrt[4]{6y^3}$ C) $x\sqrt[4]{3y^3}$ D) $6xy$

33) $(9\sqrt{2}+10\sqrt{5})(10\sqrt{2}+10\sqrt{5})$ 33) _____

A) $680+190\sqrt{10}$ B) $90\sqrt{2}+100\sqrt{5}$

C) $-320+190\sqrt{10}$ D) $90\sqrt{2}+100\sqrt{5}+190\sqrt{10}$

Without solving the given quadratic equation, determine the number and type of solutions.

34) $2x^2 = -2x - 3$ 34) _____

A) One (repeated) rational solution B) Two rational solutions

C) Two irrational solutions D) Two imaginary solutions

Solve the problem.

35) April shoots an arrow upward into the air at a speed of 32 feet per second from a platform that is 22 feet high. The height of the arrow is given by the function $h(t) = -16t^2 + 32t + 22$, where t is the time is seconds. What is the maximum height of the arrow? 35) _____

A) 21 ft B) 16 ft C) 38 ft D) 22 ft

Solve by completing the square.

36) $x^2 - 8x - 7 = 0$ 36) _____

A) $\{8 \pm \sqrt{71}\}$ B) $\{-4 \pm \sqrt{23}\}$ C) $\{4 \pm \sqrt{7}\}$ D) $\{4 \pm \sqrt{23}\}$

Solve the problem.

37) An object is propelled vertically upward from the top of a 208–foot building. The quadratic function $s(t) = -16t^2 + 240t + 208$ models the ball's height above the ground, s(t), in feet, t seconds after it was thrown. After how many seconds does the object reach its maximum height? Round to the nearest tenth of a second if necessary. 37) _____

A) 7.5 sec B) 2 sec C) 15.8 sec D) 0.8 sec

Solve the equation by making an appropriate substitution.

38) $x^{2/3} + 4x^{1/3} - 5 = 0$ 38) _____

A) {–1, 5} B) {–1, 125} C) {–5, 1} D) {–125, 1}

Without solving the given quadratic equation, determine the number and type of solutions.

39) $x^2 - 5x - 7 = 0$ 39) _____

A) Two rational solutions B) Two imaginary solutions

C) One (repeated) rational solution D) Two irrational solutions

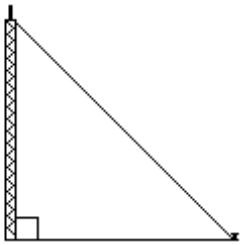
Simplify the expression.

40) $\ln e^{6y}$ 40) _____

A) $6y$ B) $\ln 6y$ C) y^6 D) e^{6y}

Solve.

41) A wire is to be attached to the top of a 28–foot antenna. If the wire must be anchored 28 feet from the base of the antenna, what length of wire is required? 41) _____



A) 28 ft B) $28\sqrt{2}$ ft C) 1568 ft D) 56 ft

Solve the problem.

42) Shelly can cut a lawn with a riding mower in 2 hours less time than it takes William to cut the lawn with a push mower. If they can cut the lawn in 5 hours working together find how long to the nearest tenth of an hour it takes for William to cut the lawn alone. 42) _____

A) 9.2 hours B) 9.1 hours C) 11.1 hours D) 11.2 hours

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

43) $\log_b\left(\frac{xy^2}{z^4}\right)$ 43) _____

A) $\log_b x + 2\log_b y - 4\log_b z$ B) $\log_b x + \log_b y^2 - \log_b z^4$

C) $\log_b x + \log_b y^2 + \log_b z^4$ D) $\log_b x + 2\log_b y + 4\log_b z$

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

44) $\frac{1}{2}\log_6 x + \log_6 y$ 44) _____

A) $\log_6 y\sqrt{x}$ B) $\log_6 \sqrt{xy}$ C) $\log_6\left(\frac{\sqrt{x}}{y}\right)$ D) $\log_6\sqrt{\frac{x}{y}}$

Solve the equation.

45) $3^{3x-1} = 9$ 45) _____

A) {0} B) {3} C) {2} D) {1}

Determine whether the values in each table belong to an exponential function, a logarithmic function, a linear function, or a quadratic function.

46) 46) _____

x	y
0	1
1	2
2	4
3	16
4	32

A) exponential B) linear C) logarithmic D) quadratic

Solve the equation.

47) $\log_3(x+4) = -1$ 47) _____

A) {– 11} B) {13} C) $\left\{-\frac{11}{3}\right\}$ D) $\left\{\frac{13}{3}\right\}$

Provide an appropriate response.

48) Use $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pert$ to solve this problem. 48) _____

Suppose that you have \$6000 to invest. Which investment yields the greater return over 9 years: 6.25% compounded continuously or 6.3% compounded semiannually?

A) \$6000 invested at 6.3% compounded semiannually over 9 years yields the greater return.

B) Both investment plans yield the same return.

C) \$6000 invested at 6.25% compounded continuously over 9 years yields the greater return.

Solve the equation.

49) $\log_7(6x-1) + \log_7 x = 1$ 49) _____

A) $\left\{\frac{7}{6}\right\}$ B) $\left\{\frac{8}{7}\right\}$ C) {–1} D) $\left\{-1, \frac{7}{6}\right\}$

Provide an appropriate response.

50) Use a calculator to evaluate $\log_4 25$ to four decimal places. 50) _____

A) 2.3219 B) 0.4307 C) 0.7959 D) 2.0000