MAT 1033 Fall 2007 - Practice Test 3
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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the expression is rational.

1) $\frac{16}{\sqrt{x}}$ 1) _____

A) No B) Yes

Use the verbal representation of a rational function to find the symbolic representation.

2) Add 2 to x and then divide the result by the quantity x plus 20. 2) _____

A) $\frac{x+2}{x}+20$ B) $\frac{x+2}{x+20}$ C) $\frac{x+2}{x-20}$ D) $\frac{x+20}{x+2}$

Evaluate f(x) at the given value of x by hand.

3) $f(x)=\frac{3x^2+4x}{5x}$; $x=-3$ 3) _____

A) - 1 B) $\frac{13}{5}$ C) 1 D) $-\frac{13}{5}$

Solve the equation.

4) $\frac{8}{x+7}=-\frac{2}{9}$ 4) _____

A) x = - 29 B) No solution C) x = - 43 D) $x=-\frac{79}{9}$

5) $\frac{4}{x-1}=\frac{3}{x+4}$ 5) _____

A) x = 1, - 4 B) $x=\frac{13}{7}$ C) $x=-1,\frac{1}{4}$ D) x = - 19

Solve the problem.

6) In the following formula, y is the minimum number of hours of studying required to attain a test score of x: $y=\frac{0.55x}{100.5-x}$. How many hours of study are needed to score 83? 6) _____

A) 4.52 hr B) 100.83 hr C) 2.61 hr D) 26.10 hr

Simplify.

7) $-\frac{2}{11}\div\left(-\frac{1}{5}\right)$ 7) _____

A) $-\frac{10}{11}$ B) $\frac{10}{11}$ C) $-\frac{2}{55}$ D) $\frac{11}{10}$

Simplify the expression.

8) $\frac{4x + 3}{12x^2 + 17x + 6}$ 8) _____

A) $\frac{1}{3x + 2}$ B) $\frac{4x + 3}{12x^2 + 17x + 6}$ C) $\frac{4x}{3x + 2}$ D) $\frac{4x + 3}{3x + 17}$

Find the reciprocal.

9) $\frac{x}{x + 5}$ 9) _____

A) 5 B) $\frac{1}{x(x + 5)}$ C) $x(x + 5)$ D) $\frac{x + 5}{x}$

Simplify the expression.

10) $\frac{k^2 + 7k + 10}{k^2 + 9k + 20} \cdot \frac{k^2 + 4k}{k^2 - 2k - 8}$ 10) _____

A) $\frac{1}{k - 4}$ B) $\frac{k}{k - 4}$ C) $\frac{k^2 + 4k}{k - 4}$ D) $\frac{k}{k^2 + 9k + 20}$

11) $\frac{z^2 + 7z + 10}{z^2 + 12z + 35} \div \frac{z^2 + 2z}{z^2 + 13z + 42}$ 11) _____

A) $z + 6$ B) $\frac{z + 6}{z}$ C) $\frac{z}{z^2 + 12z + 35}$ D) $\frac{z + 6}{z^2 + 7z}$

Find the least common multiple.

12) $3x + 15$, $x^2 + 5x$ 12) _____

A) $3x^2 + 5$ B) $3x + 5$ C) $3x(x + 5)$ D) $3x^2 + 15$

Simplify.

13) $\frac{2m}{m - 5} - \frac{10}{m - 5}$ 13) _____

A) $\frac{2(m + 5)}{m - 5}$ B) 0 C) 2 D) $\frac{2}{m - 5}$

14) $\frac{3}{5x + 5} + \frac{1}{20x + 80}$ 14) _____

A) $\frac{13x + 49}{20(x + 1)(x + 4)}$ B) $\frac{-11x - 47}{(5x + 1)(4x + 4)}$ C) $\frac{11x + 47}{20(x + 1)(x + 4)}$ D) $\frac{13x + 49}{(5x + 1)(4x + 4)}$

Solve the problem.

15) The formula 15) _____

$$a = \frac{v_2 - v_1}{t_2 - t_1}$$

gives an object's average acceleration a when its velocity changes from v_1 at time t_1 to v_2 at time t_2. Solve for t_2.

A) $t_2 = \frac{a - t_1}{v_2 - v_1}$ B) $t_2 = \frac{v_2 - v_1 + t_1}{a}$

C) $t_2 = \frac{v_2 - v_1 + at_1}{a}$ D) $t_2 = \frac{v_2 - v_1}{a - t_1}$

Solve the equation.

16) $\frac{x - 9}{x + 1} = -5$ 16) _____

A) $x = -\frac{7}{3}$ B) $x = \frac{7}{2}$ C) No solution D) $x = \frac{2}{3}$

Solve the rational equation symbolically, numerically, or graphically.

17) $\frac{1}{x - 1} + \frac{1}{2x - 2} = \frac{3}{2}$ 17) _____

A) $x = 2$ B) $x = 1$ C) $x = 6$ D) $x = 0$

Solve the formula for the specified letter.

18) $P = \frac{A}{1 + rt}$ for r 18) _____

A) $r = \frac{P - 1}{At}$ B) $r = \frac{A - P}{Pt}$ C) $r = \frac{P - A}{1 + t}$ D) $r = P - tA$

Solve.

19) Martha can rake the leaves in her yard in 4 hours. Her younger brother can do the job in 6 hours. How long will it take them to do the job if they work together? 19) _____

A) $\frac{12}{5}$ hr B) 6 hr C) $\frac{5}{12}$ hr D) 12 hr

Divide and simplify.

20) $\frac{\frac{5}{6}}{\frac{8}{5}}$ 20) _____

A) $\frac{48}{25}$ B) $\frac{3}{4}$ C) $\frac{4}{3}$ D) $\frac{25}{48}$

Simplify the expression.

21) $\dfrac{\frac{2}{5r - 1} - 2}{\frac{2}{5r - 1} + 2}$ 21) _____

A) $\dfrac{5r}{2 - 5r}$ B) $\dfrac{2 - 5r}{5r}$ C) $\dfrac{2 - r}{r}$ D) $\dfrac{2 + 5r}{5r}$

Simplify the expression, using only positive exponents in your answer.

22) $\dfrac{x^{-4} + y^{-4}}{x^{-1} + y^{-1}}$ 22) _____

A) $\dfrac{y^4 + x^4}{x^3y^4 + x^4y^3}$ B) $\dfrac{1}{x + y}$ C) $\dfrac{1}{x^3 + y^3}$ D) $\dfrac{y^4 + x^4}{x^3 + y^3}$

Solve the proportion.

23) $\dfrac{12}{x} = \dfrac{4}{8}$ 23) _____

A) 12 B) 24 C) 48 D) 96

Write a proportion that models the situation described. Then, solve the proportion for x.

24) 7 is to 12, as 2 is to x 24) _____

A) $\dfrac{7}{12} = \dfrac{2}{x}; x = \dfrac{26}{7}$ B) $\dfrac{7}{12} = \dfrac{x}{2}; x = \dfrac{7}{5}$ C) $\dfrac{7}{12} = \dfrac{2}{x}; x = \dfrac{24}{7}$ D) $\dfrac{7}{12} = \dfrac{x}{2}; x = \dfrac{7}{6}$

Solve the problem.

25) Suppose that y is directly proportional to x and that y = 36 when x = 6. Find the constant of proportionality k. Then, find y when x = 13. 25) _____

A) k = 8; y = 104 B) k = 6; y = 78

C) k = 216; y = $\dfrac{216}{13}$ D) k = - 6; y = - 78

26) Suppose that y is inversely proportional to x and that y = 32 when x = 3. Find the constant of proportionality k. Then, find y when x = 8. 26) _____

A) k = 48; y = 6 B) k = 96; y = 12 C) k = 24; y = 3 D) k = $\dfrac{32}{3}$; y = $\dfrac{256}{3}$

27) Suppose that z varies jointly with x and y and that z = 1080 when x = 10 and y = 18. Find the constant of proportionality k. Then, find z when x = 3 and y = 6. 27) _____

A) k = 0.6; z = 10.8 B) k = 6; z = 108

C) k = 194,400; z = 10800 D) k = 8; z = 144

Determine whether the data represent direct variation, inverse variation, or neither.

28)

x	1	2	3	4
y	2.1	4.2	6.3	8.4

28) _____

A) Inverse B) Direct C) Neither

Solve the problem.

29) The intensity I of light varies inversely as the square of the distance D from the source. If the intensity of illumination on a screen 5 ft from a light is 2 foot-candles, find the intensity on a screen 15 ft from the light. 29) _____

A) $1\frac{2}{9}$ foot-candles B) 2 foot-candles

C) $\frac{25}{113}$ foot-candle D) $\frac{2}{9}$ foot-candle

If possible, evaluate the expression by hand. If not, approximate the answer to the nearest hundredth.

30) $\sqrt{196}$ 30) _____

A) 38,416 B) 16 C) 28 D) 14

31) $\sqrt[3]{-10x^{12}}$ 31) _____

A) $30x^4$ B) $3.16x^4$ C) $-2.15x^4$ D) $-10x^4$

32) $\sqrt[5]{32(3x - 20)^{20}}$ 32) _____

A) $-2(3x - 20)^4$ B) $160(3x - 20)^4$ C) $2(3x - 20)^4$ D) $32(3x - 20)^4$

Write the expression using radical notation.

33) $16^{3/4}$ 33) _____

A) 8 B) $\sqrt[3]{8}$ C) 64 D) 11

Simplify the expression involving rational exponents.

34) $256^{5/4}$ 34) _____

A) 262,144 B) 1024 C) 16,384 D) 65,536

If possible, evaluate the expression by hand. If not, approximate the answer to the nearest hundredth.

35) $(25)^{-1/2}$ 35) _____

A) -5 B) $\frac{1}{5}$ C) $-\frac{1}{5}$ D) 5

Simplify the expression. Assume that all variables are positive.

36) $\left(\frac{x^6}{y^4}\right)^{-1/2}$ 36) _____

A) $\frac{x^3}{y^2}$ B) $\frac{x^2}{y^3}$ C) $\frac{y^3}{x^2}$ D) $\frac{y^2}{x^3}$

37) $\sqrt[5]{\frac{t^5}{z^{10}}}$ 37) _____

A) $\frac{t}{z^2}$ B) $\frac{z^2}{t}$ C) t^2z D) tz^2

38) $z^{3/4}(z^{1/4} - z^{-1/4})$ 38) _____

A) $z^{1/2} - z$ B) $z^{1/2} + 2z$ C) $z - z^{1/2}$ D) $z + z^{1/2}$

39) $\sqrt{(3x + 8)^2}$ 39) _____

A) $|3x + 8|$ B) $(3x + 8)^2$

C) Not a real number D) $3x + 8$

Simplify the expression. If any variables are present, assume that they are positive.

40) $\sqrt{15} \cdot \sqrt{108}$ 40) _____

A) $18\sqrt{5}$ B) $30\sqrt{3}$ C) $-18\sqrt{5}$ D) $-30\sqrt{3}$

41) $\sqrt{\frac{64}{z}} \cdot \sqrt{\frac{z}{17}}$ 41) _____

A) $\frac{8}{34}$ B) $\frac{8\sqrt{17}}{17}$

C) $\frac{\sqrt{17}}{8}$ D) Not a real number

42) $\sqrt{3x^3} \cdot \sqrt{3x^5}$ 42) _____

A) $\sqrt{9x^8}$ B) $3x^4$ C) $\sqrt{3x^4}$ D) $x^4\sqrt{6}$

43) $\frac{\sqrt[3]{104x^4y^2}}{\sqrt[3]{13x^2y}}$ 43) _____

A) $13\sqrt[3]{x^2y}$ B) $2x\sqrt[3]{xy}$ C) $6\sqrt[3]{xy^2}$ D) $2\sqrt[3]{x^2y}$

Use properties of polynomials to simplify the expression.

44) $\sqrt{x + 5} \cdot \sqrt{x - 5}$ 44) _____

A) $x - 5$ B) $\sqrt{x^2 + 25}$ C) $\sqrt{x^2 - 25}$ D) $x - 25$

Solve the equation.

45) $\sqrt{18} =$ _____ $\sqrt{2}$ 45) _____

A) 9 B) 6 C) Not possible D) 3

Simplify the radical expression by factoring out the largest perfect nth power.

46) $\sqrt[3]{48}$ 46) _____

A) $6\sqrt[3]{2}$ B) $2\sqrt[3]{6}$ C) 3 D) 6

Simplify the radical expression by factoring out the largest perfect nth power. Assume that all variables are positive.

47) $\sqrt[3]{-64a^8b^5}$ 47) _____

A) $4\sqrt[3]{a^2b^2}$ B) $4ab\sqrt[3]{a^2b^2}$ C) $4ab\sqrt[3]{a^3b^3}$ D) $-4a^2b\sqrt[3]{a^2b^2}$

Simplify the expression. If any variables exist, assume that they are positive and write your answer in radical notation.

48) $\sqrt{5} \cdot \sqrt[5]{4}$ 48) _____

A) $\sqrt[10]{50{,}000}$ B) $\sqrt[10]{10{,}000}$ C) $\sqrt[10]{20}$ D) $\sqrt[7]{50{,}000}$

49) $\sqrt[4]{x^2} \cdot \sqrt[5]{x^3}$ 49) _____

A) $\sqrt[10]{x}$ B) $\sqrt[20]{x^5}$ C) $x\sqrt[20]{x}$ D) $x\sqrt[10]{x}$

Rationalize the denominator.

50) $\sqrt{\frac{50}{x}}$ 50) _____

A) $5\sqrt{2x}$ B) $\frac{5\sqrt{2x}}{x}$ C) $\frac{\sqrt{5x}}{x}$ D) $5\sqrt{\frac{2}{x}}$

Simplify the expression. If any variables exist, assume that they are positive.

51) $\sqrt{5x} + 7\sqrt{80x} + 4\sqrt{180x}$ 51) _____

A) $52\sqrt{5x}$ B) $53\sqrt{5x}$ C) $12\sqrt{265x}$ D) $11\sqrt{265x}$

52) $7\sqrt[4]{m^9p^6} - 2m^2p\sqrt[4]{mp^2}$ 52) _____

A) $9mp^2\sqrt[4]{mp^2}$ B) $5m^2p\sqrt[4]{mp^2}$

C) 5 D) Cannot be simplified

53) $\sqrt{7x} - \frac{\sqrt{x}}{\sqrt{7}}$ 53) _____

A) $\frac{6\sqrt{7x}}{7}$ B) $-\frac{1}{7}$ C) $\frac{\sqrt{7x}}{7}$ D) 0

Multiply, then simplify the product. If variables are present, assume they are positive.

54) $(\sqrt{2} + 6)(\sqrt{3} + 2)$ 54) _____

A) $3\sqrt{6} + 12$ B) $\sqrt{6} + \sqrt{3} + 12$

C) $\sqrt{6} + 12$ D) $\sqrt{6} + 2\sqrt{2} + 6\sqrt{3} + 12$

Rationalize the denominator.

55) $\frac{\sqrt{5}}{5\sqrt{6} - \sqrt{5}}$ 55) _____

A) $\frac{\sqrt{30} - 1}{29}$ B) $\frac{\sqrt{30} + 1}{31}$ C) $\frac{\sqrt{30} + 1}{29}$ D) $\frac{\sqrt{6} + 1}{29}$

Evaluate the function at the given value of the variable.

56) $f(x) = \sqrt{x + 5} + \sqrt{x}$ at $x = 4$ 56) _____

A) 2 B) 1 C) 4 D) 5

Find the domain of f. Write your answer in interval notation.

57) $f(x) = \sqrt{6x + 2}$ 57) _____

A) $\left(-\frac{1}{3}, \infty\right)$ B) $\left[-\frac{1}{3}, \infty\right)$ C) $\left(-\infty, -\frac{1}{3}\right)$ D) $\left(\frac{1}{3}, \infty\right)$

Solve the equation.

58) $2x^2 = 8$ 58) _____

A) ±2 B) 5 C) -2 D) 2

59) $(16 - 8x)^2 = 1600$ 59) _____

A) 2, 7 B) 0, 2 C) 3, 7 D) -3, 7

Solve the equation symbolically.

60) $\sqrt{7a - 6} = \sqrt{5a + 9}$ 60) _____

A) $\frac{2}{15}$ B) $\frac{3}{2}$ C) $\frac{15}{2}$ D) $\frac{15}{12}$

61) $\sqrt{3x + 1} = 3 + \sqrt{x - 4}$ 61) _____

A) -1 B) -5, -8 C) 5, 8 D) No solution

62) $\sqrt{3x - 2} + \sqrt{11 + x} = -1$ 62) _____

A) No solution B) $-\frac{5}{2}$ C) 0 D) 5

Solve the formula for the indicated variable.

63) $r = \sqrt{\frac{S}{4\pi}}$ for S 63) _____

A) $S = 4\pi r$ B) $S = 16\pi^2 r^2$ C) $S = 4\pi r^2$ D) $S = \frac{r^2}{4\pi}$

Find the length of the missing side of the right triangle. Round to three decimal places, if necessary.

64) $a = 10, c = 26$ 64) _____

A) $b = 25$ B) $b = 18$ C) $b = 24$ D) $b = 28$

Use the distance formula to find the distance between the two points. Unless specified otherwise, give your answer in exact form.

65) (1, 3) (-4, -7) 65) _____

A) 75 B) 5 C) $75\sqrt{3}$ D) $5\sqrt{5}$

Find x if the distance between the given points is d. Assume that x is positive.

66) (x, 4), (-2, 3), $d = \sqrt{17}$ 66) _____

A) 2 B) 6 C) 3 D) 5

Solve the problem.

67) The period, P, of a pendulum in seconds is given by the formula $P = 2\pi\sqrt{\frac{L}{32}}$, where L is the length of the pendulum. Find P when the value of L is 17 inches. Round your answer to the nearest hundredth. 67) _____

A) 2.29 seconds B) 4.58 seconds C) 5.58 seconds D) 3.29 seconds

68) A formula for calculating the distance, d, that can be seen from an airplane to the horizon is $d = 1.22\sqrt{x}$, where x is the altitude of the plane in feet. Find d when the altitude is 18,878 feet. Round your answer to the nearest hundredth. 68) _____

A) 138.62 feet B) 267.62 feet C) 11,515.58 feet D) 167.62 feet