Math 0702 Review Problems – Final Exam

The following set of problems is only a sample of the type of problems that might appear on the Final Exam. The best way to review for the final is to retake your quizzes and tests from the semester and review the exercises that were assigned.

Evaluate problems 1 – 5, if possible.

1. $(-3)^4$
2. -3^4
3. $-\sqrt{64}$
4. $\sqrt[3]{-64}$
5. $\sqrt[6]{-64}$

6. Evaluate $\sqrt{a-b}$ given that $a=81$ and $b=-63$.

7. Solve these equations.

   a. $7x+7=-14$
   b. $0.7(y-14)-0.5y=32.2$
   c. $(z+5)-7=(z-7)+5$
   d. $-(y+5)-(2+7y)+8y=3y-8$
   e. $10x-5(x+4)+9=-11+5x+21$
   f. $-8b+6+6b=-3b+11+b$
   g. $-\frac{1}{2}(2x-4)=\frac{3}{5}(5x-10)$
   h. $\frac{x}{3}+\frac{2-3x}{6}=\frac{5}{18}$

8. Solve these inequalities and use interval notation to define the solution sets. Solve the application problems by first formulating an inequality and then solving it.

   a. $-13+x>-12$
   b. $-3(4-2x)\le 18$
   c. $3x-4(2-x)<3(x-2)-4$
   d. $-4<2x+5\le 19$
   e. To receive an A in a course, Jessica must have an average of 90 or above. If her first four exam scores are 96, 90, 87, and 95, what is the minimum grade Jessica can receive on the last exam to get the A she desires?
   f. A custodian must move a shipment of books from the first floor to the sixth floor. The elevator's weight limit is 900 pounds. If the custodian weighs 160 pounds and each box of books weighs 37 pounds, find the maximum number of boxes the custodian can move on the elevator at one time.

9. Solve these compound inequalities and use interval notation to define the solution sets.

   a. $\frac{1}{6}<\frac{4x-3}{3}\le\frac{4}{5}$
   b. $x\ge 2$ and $x<-5$
   c. $3x-5>6$ or $-x<-5$
   d. $x\le 2$ or $x>-5$
   e. $-2x\le 6$ and $-2x+3<-7$

10. Solve each absolute value equation.

a. $|x-8|-19=0$

b. $\left|\frac{x}{2}-7\right|=\frac{5}{2}$

c. $|4x+11|+8=3$

d. $|1-3x|=0$

e. $4|x-5|+10=18$

f. $\left|\frac{1}{2}x+6\right|=\left|8-\frac{2}{3}x\right|$

11. Solve these absolute value inequalities. Write the solution sets using interval notation.

a. $|2x-4|<6$

b. $\left|\frac{4x-4}{5}\right|\geq 8$

c. $|5x+2|\leq 0$

d. $|3x-2|+2>6$

e. $|2x-3|\geq -5$

f. $|2-3x|-7<-2$

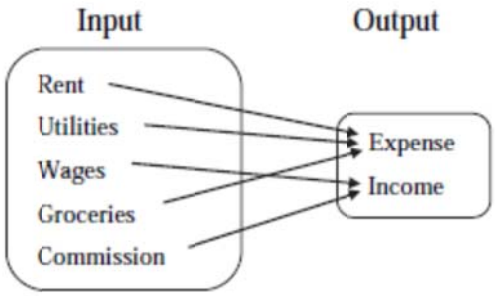
12. Find the domain and range of each relation. Determine whether each relation is a function.

a. $\{(0,3),(1,1),(2,2),(1,-2)\}$

b. $\{(-4,3),(-2,2),(0,1),(2,0)\}$

c. $\{(5,3),(7,3),(4,2),(-1,2)\}$

d.



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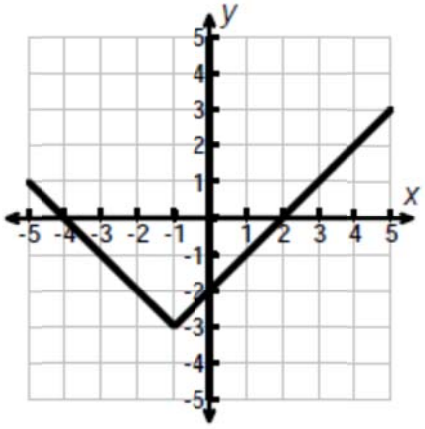

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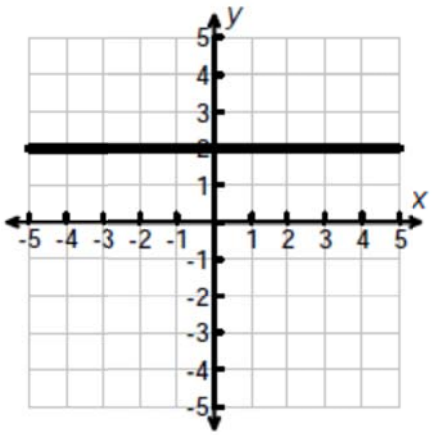
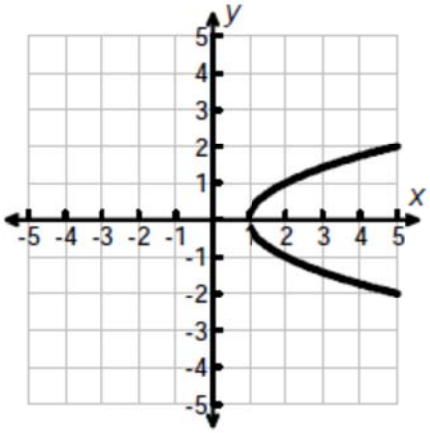


g.



13. Which of the following is a linear function?

    a. $x^2 = y - 2$
    b. $3x + 2y = 7$
    c. $x^3 - y = 4$
    d. $y = 11 - 3x$
    e. $x - 2 = 4$
    f. $y = |x - 5|$

14. Decide whether or not the given ordered pair is a solution for the given equation.

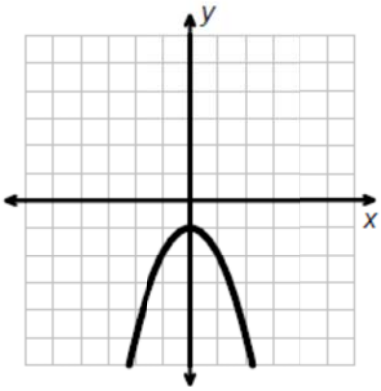
    a. $y = \frac{3}{4}x - 2$; $(-12,\ -11)$
    b. $5x + 3y = 35$; $(4,\ 5)$

15. Given the following functions, find the indicated values. Show the step of substituting.

    a. $f(x) = 4x - 6$; $f(-3)$
    b. $g(x) = 5x^2 + 12x - 3$; $g(3)$
    c. $h(x) = 5$; $h(-2)$
    d. $R(x) = \dfrac{9}{x - 3}$; $R(-12)$

16. Answer the following questions. The function $y = g(x)$ is graphed below. Use it to answer questions pertaining to the function g.

    a. If $f(-2) = 7$, write the corresponding ordered pair.
    b. Find $g(1)$.
    c. Find all values of x such that $g(x) = -1$.
    d. Find all values of x such that $g(x) = -5$.



17. Find the x - and y -intercepts for the graphs of the following equations, then graph them.

    a. $x - 2y = 5$
    b. $2x + 3y = 6$
    c. $y = \frac{2}{3}x - 1$

18. Determine the slope and y -intercept of the graphs of these equations.

    a. $f(x) = \frac{3}{5}x - 2$
    b. $4x - 3y = 7$
    c. $y = -5$

19. Graph these linear equations by the method of your choosing.

a. $-4x-16y=-20$
b. $f(x)=2x+4$
c. $3x-8=y$
d. $2x+5=0$
e. $y=3x$

20. Determine the slope of the line through the given points.

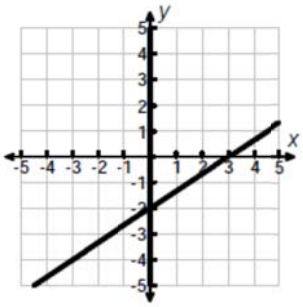
a. $(-4,\ 2)$ and $(-3,\ -5)$
b. $(5,\ 3)$ and $(7,\ 3)$

c. Find the slope in this problem.

What is the slope of a road that rises 25 feet vertically for every 200 feet of Horizontal distance?

d. Match the graph with its equation.

- $y=\frac{2}{3}x+2$
- $y=\frac{2}{3}x-2$
- $y=-\frac{2}{3}x+2$
- $y=-\frac{2}{3}x-2$



21. Write the equation of the line using the information given in the indicated form.

a. $m=\frac{1}{4}$; y-intercept is -3; slope-intercept form
b. $m=-\frac{3}{7}$; y-intercept $(0,\ 5)$; standard form
c. through the points $(2,\ -6)$ and $(-3,\ -5)$; use function notation
d. through the points $(3,\ 2)$ and $(4,\ 5)$; standard form

22. Determine whether the graphs of the equations are parallel lines, perpendicular lines, or neither. Show work justifying your responses.

a. $3x-8y=14$
$32x+12y=14$

b. $y=4x-4$
$16x+4y=6$

23. Write the equation of the line in the standard form, $Ax+By=C$, with A, B, and C integers and $A>0$, through the point $(-2,\ 4)$ and perpendicular to the line, $2x+y=-4$.

Evaluate problems 24 - 37 by performing the indicated operation and simplifying. Your answers should be expressed without negative exponents.

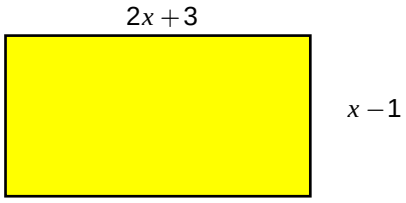
24. 3^{-2}
25. $\left(\frac{3}{2}\right)^{-3}$
26. $x\cdot x^{-8}$
27. $x^{12}\div x^{3}$
28. $\frac{p^{2}}{p^{-7}}$
29. $\frac{x^{2}}{x^{-3}}$
30. $(-4x^{5})(-5x^{3})$
31. $(4x^{7}y^{2})(-6xy^{3})$
32. $\left(-2x^{0}y^{3}\right)\left(4x^{2}y^{4}\right)+\left(2y^{5}\right)(3xy)^{2}$
33. $\left(-2x^{-2}y^{3}\right)^{-4}$
34. $\left(2^{3}a\right)^{5}$
35. $\left(\frac{x^{5}}{y^{5}z^{8}}\right)^{3}$
36. $\frac{(2y)^{-3}}{y^{-1}\cdot y^{3}}$
37. $\frac{(3a)^{-3}}{\left(a^{-5}b^{3}\right)^{-2}}$

Combine the polynomials in problems 38 - 47 according to the operation indicated and simplify.

38. $(3x^2-8x+2)+(4x^2-2x-9)$
39. $(-5x^2+7x-9)-(-2x^2-8x+6)$
40. $(-5x^5+7x^7+9+6x^6)-(-2+3x^6+9x^7-8x^5)$
41. $-3a^3(2a^4+5a-7)$
42. $\left(\frac{1}{7}x^8\right)\left(-\frac{1}{4}x^2\right)$
43. $(3x-5)(4x+7)$
44. $(7x-3)^2$
45. $\left(x+\frac{1}{6}\right)\left(x-\frac{1}{6}\right)$
46. $(x-7)(2x^2+3x-4)$
47. Use special product methods to multiply.
    a. $[6-(2a-b)][6+(2a-b)]$
    b. $(x+7)(x-7)(x^2+49)$

48. If $f(x)=2x^2-x$, find the following.
    a. $f(n-2)$
    b. $f(a+h)-f(a)$

49. Write an expression for the area of the figure shown.



Completely factor the polynomials in problems 50 - 67.

50. $6y-18$
51. $4x^2y^3-12x^3y^2$
52. $x^2-12x+35$
53. $x^2-5x-36$
54. $2p^5+54p^2$
55. $10a^2-19a+6$
56. $4x^2-28x+49$
57. x^2-25
58. $8x^2+14x-15$
59. x^4-81
60. $-4x^2+64$
61. $2-18a^2$
62. $mn+mp-7n-7p$
63. $5x^3+10x^2-75x$
64. $y^2-\frac{1}{144}$
65. $36+x^2$
66. x^3-y^3
67. r^6+t^9

Solve the equations given in problems 68 - 74.

68. $x(x-4)=0$
69. $\left(\frac{3}{8}z\right)\left(z-\frac{1}{3}\right)=0$
70. $y^2=4y+12$
71. $6x^2-7x=5$
72. $3b^3-9b^2=54b$
73. $a(3a+16)=-16$
74. $x^3+4x^2=x+4$

Solve application problems 75 and 76.

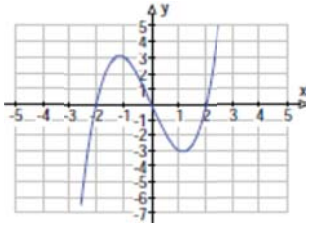
75. One number exceeds another number by 6 and the product of the two numbers is 72. Find the numbers by first formulating an equation that interprets the problem.

76. Suppose an object is thrown upwards with an initial velocity of 64 feet per second off the edge of a 960-foot Cliff. The height $h(t)$ in feet of the object after t seconds is given by the function, $h(t)=-16t^2+64t+960$.
    a. Determine the height of the object after 2 seconds.
    b. Determine how long it takes the object to strike the ground.

77. Match each polynomial function with its graph.

- $f(x) = (x-2)(x+3)$
- $g(x) = (2x-1)(x+2)$
- $h(x) = x(x+2)(x-2)$

A



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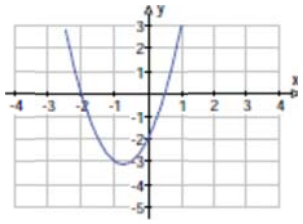

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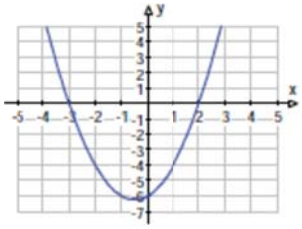


78. Evaluate the rational expression, $f(x) = \dfrac{3x-5}{x^2-4}$, for the given values of x.

a. $f(3)$ b. $f(0)$ c. $f(-2)$

79. Find the value(s) of the variable for which the following are defined. State the domain of each function using interval notation.

a. $R(x) = \dfrac{3x-5}{x+3}$ b. $Q(x) = \dfrac{x^2-36}{x^2-5x-24}$

80. Reduce the following rational expressions to lowest terms.

a. $\dfrac{-8r^5s^2t^7}{12r^{10}st^3}$ b. $\dfrac{7x-x^2}{x^2-10x+21}$

c. $\dfrac{a^3+b^3}{a^2-b^2}$ d. $\dfrac{y^2-5y-14}{y^2+11y+18}$

Find the following sums, differences, products, or quotients. Express answers reduced to lowest terms and assume all variables have nonzero values. (Problems 81 - 91)

81. $\dfrac{3m^2n}{9x^2y} \cdot \dfrac{27x^4y^3}{6mn}$

82. $\dfrac{12x^5y^4}{7a^3b^2} \div \dfrac{4x^2y}{21a^2b}$

83. $\dfrac{3xy-6x}{a^3} \div \dfrac{2x-xy}{a^4}$

84. $\dfrac{8x^2-4x}{2x^2+5x-3} \cdot \dfrac{x^2-9}{2x}$

85. $\dfrac{r^2+6r+9}{r^2+7r+12} \cdot \dfrac{r^2+4r}{r^2-3r-18}$

86. $\dfrac{a}{a^2-25} - \dfrac{5}{a^2-25}$

87. $\dfrac{4}{k} - \dfrac{6}{k+2}$

88. $\dfrac{4}{x^2-16} + \dfrac{x+2}{x^2+4x}$

89. $\dfrac{2}{x-9} + \dfrac{5}{9-x}$

90. $\dfrac{b}{4b+16} - \dfrac{4}{b^2+4b}$

91. $\dfrac{y+1}{y^2-4y-21} - \dfrac{y+2}{y^2+6y+9}$

92. Decide which of the following quotients can be found using synthetic division and then use the process to find those quotients.

a. $(4x^3-6x^2+1)\div(2x+3)$

b. $(x^3+5x^2+6x+30)\div(x+5)$

c. $(6x^4+5x^3-10x+4)\div(x-\frac{2}{3})$

d. $(2x^3+3x^2-2x+2)\div(x^2+3)$

Find the following roots, if they exist. If the root does not exist, write, "The root does not exist as a real number." (Problems 93 - 108)

93. $-\sqrt{-225}$

94. $-\sqrt[3]{-64}$

95. $\sqrt{132}$

96. $\sqrt{36y^2}$

97. $\sqrt[3]{24}$

98. $\sqrt{81m^{22}}$

99. $\sqrt[5]{32x^5}$

100. $\sqrt{32x^2y^6}$

101. $\sqrt[3]{72x^6y^{12}}$

102. $\sqrt{x^2+6x+9}$

103. $\sqrt{18a^9}$

104. $\sqrt[3]{64p^7q^{10}}$

105. $-\sqrt{\frac{15x^{27}}{y^{15}}}$

106. $\sqrt[4]{x^2y^6z^6}\cdot\sqrt[4]{x^9y^3z^7}$

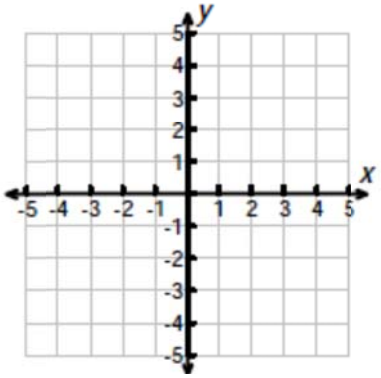
107. $\frac{\sqrt[5]{96a^{12}b^4}}{\sqrt[5]{3a^2b^{-4}}}$

108. If $f(x)=\sqrt{3x-5}$, find

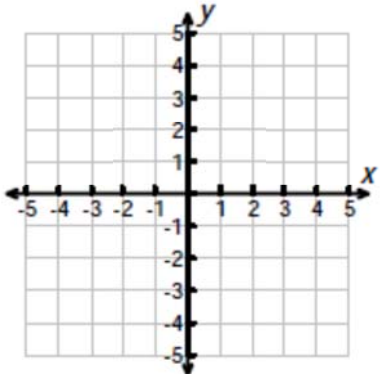
a. $f(2)$ b. $f(3)$ c. $f(0)$ d. $f(11)$

For the functions of Problems 109 and 110, find the domain and then graph the functions.

109. $f(x)=\sqrt{x+3}$



110. $f(x)=\sqrt{x}-2$



Use radical notation to write each expression and simplify, if possible. (Problems 111 - 116)

111. $-81^{1/2}$

112. $\left(\frac{25}{36}\right)^{3/2}$

113. $\left(9x^{10}\right)^{1/2}$

114. $(3m)^{1/5}$

115. $\left(3x^4\right)^{1/2}$

116. $(6x-1)^{2/3}$

Write each expression with positive exponents and simplify, if possible. (Problems 117 - 120)

117. $9^{-3/2}$

118. $25^{-5/4}$

119. $\frac{1}{x^{-1/3}}$

120. $\frac{4}{7y^{-2/3}}$

Use properties of exponents to simplify each expression, writing answers with positive exponents. Assume that all variables represent positive numbers. (Problems 121 - 125)

121. $10^{2/3} \cdot 10^{1/9}$

122. $\left(81^{1/4} \cdot x^{3/4}\right)^2$

123. $x^2 \cdot x^{-7/3}$

124. $(x^2 y)^{1/4} x^{3/2} y^{-3/8}$

125. *Multiply*. $(y^{1/2} + 5)(y^{1/2} + 4)$

Multiply, and then simplify. Assume that all variables represent non-negative numbers. (Problems 126 - 131)

126. $\sqrt{5y}(\sqrt{y} + \sqrt{5})$

127. $4\sqrt[3]{3}(9\sqrt[3]{9} + 7\sqrt[3]{7})$

128. $(3\sqrt{2} - 2\sqrt{8})(2\sqrt{3} - 4\sqrt{5})$

129. $(\sqrt{2x} + \sqrt{50})^2$

130. $(\sqrt[3]{2} - 6)(\sqrt[3]{4} + 3)$

131. $(\sqrt{2x-3} + 7)(\sqrt{2x-3} - 7)$