Math 0308 Final Exam Review

Solve the given equations.
1. \(3x + 14 = 8x - 1\)  
2. \(3(4x - 1) = 5x + 6\)  
3. \(8 - (3x + 4) = 6x\)
4. \(5(2x + 1) - 3(x + 4) = -21\)  
5. \(3(4x + 5) - 5(2x - 7) = 2(6x + 1)\)
6. \(2(3x + 1) + 4(2x - 2) = 2(7x - 3)\)  
7. \(5[2(3x - 1) - 6(x + 2)] = 3x - 7\)
8. \(3x + 14 = 3(x - 2) + 20\)  
9. \(3x + 14 = 5(x - 2) - 2(x + 7)\)

Solve the following inequalities. Graph your solution on a number line.
10. \(x - 7 \leq -4\)  
11. \(4x + 9 > 3\)  
12. \(1 - 9x \geq 4\)
13. \(2x + 15 > 7x - 1\)  
14. \(-1 < 3x + 8 \leq 5\)  
15. \(-4 < 4 - 2x < 6\)

Use equations and algebraic methods to find solutions of the following problems.
16. Five minus 4 times a number is 3. What is the number?
17. Find three consecutive odd integers whose sum is \(-21\).
18. A 43 inch board is cut into three pieces. The second piece is one-half as long as the first piece. The third piece is 7 inches longer than the second piece. How long is each piece?
19. The perimeter of a rectangle is 36 feet. The length is 2 feet more than 3 times the width. What are the dimensions of the rectangle?
20. Michael has $7.95 in dimes and quarters. He has a total of 39 coins. How many of each type of coin does he have?
21. Jeffrey has $11.75 in nickels and quarters. The number of quarters is 5 more than 4 times the number of nickels. How many of each type of coin does he have?
22. Melissa has $220 in $1 bills, $5 bills, and $10 bills. The number of $1 bills is 3 times the number of $5 bills. The number of $10 bills is 4 more than the number of $5 bills. How many of each type of bill does she have?
Using the laws of exponents, simplify the following expressions. Write your answers with positive exponents. Assume that all variables represent non-zero numbers.

23. \( \frac{3^6}{3^4} \)  
24. \( (x^4)^6 \)  
25. \( \left( \frac{3x^4}{y^8} \right)^3 \)  
26. \( \frac{39x^5y^{12}}{3x^4y^6} \)

27. \( \left( \frac{8x^5y^6}{2x^2y^2} \right)^3 \)  
28. \( 5^0 + 5^{-1} \)  
29. \( x^4 \cdot x^{-7} \)  
30. \( \frac{x^{-5}}{x^2} \)

31. \( \frac{14x^2y^6}{21x^{-10}y^{-3}} \)  
32. \( (4x^{-2}y^{-7})^{-3} (6^{-1}x^3y^{-2})^{-2} \)  
33. \( \left( \frac{4x^{-4}y^{-3}}{7x^2y^{-6}} \right)^{-2} \)  
34. \( \frac{(3x^{-8}y^{-2})(2x^{-2}y^{-1})^{-3}}{(8x^{-2}y^{-2})} \)

Perform the indicated operations, and simplify all answers.

35. \( (x^2 - 5x - 12) + (7x^2 - 3x + 4) \)  
36. \( (5x^2 - x + 6) - (x^2 - 8x - 2) \)  
37. \( (-5x^3)(8x^7) \)

38. \( (3x + 8)(6x - 5) \)  
39. \( (5x + 6)(3x^2 - 2x + 3) \)  
40. \( (x - 11y)(x + 11y) \)

41. \( (3x + 5)^2 \)  
42. \( (4x - 3y)^2 \)  
43. \( \frac{12x^2 - 40x + 28}{4x} \)

44. \( \frac{24x^5yz + 6x^4y^2z^3 - 4x^3y^3z^5}{3x^4yz^2} \)  
45. \( \frac{6x^2 + 22x - 5}{2x + 8} \)  
46. \( \frac{2x^4 + 8x^3 + 7x^2 - 7}{2x^2 + 2x - 5} \)

Completely factor the following polynomials.

47. \( 6x^3 + 12xy \)  
48. \( x^2 - 81 \)  
49. \( 3x^3 - 27x \)  
50. \( x^2 + 6x + 8 \)

51. \( x^2 - 9x + 14 \)  
52. \( x^2 - 6x - 27 \)  
53. \( 6x^2 - 11x - 2 \)  
54. \( 5x^2 + 7x - 6 \)

55. \( 6x^3 - 7x^2 - 10x \)  
56. \( 6xy + 21x + 10y + 35 \)  
57. \( 6xy + x - 30y - 5 \)

58. \( 12x^3 - 28x^2 - 3x + 7 \)  
59. \( x^3 - 125 \)  
60. \( 8x^3 + 27 \)  
61. \( 4y^3 - 4 \)
Solve the given equations.

62. \((x - 2)(x + 5) = 0\)  
63. \(4x^2 - 49 = 0\)  
64. \(2x^2 + 5x - 10 = x^2 + 2x + 8\)

65. \(3x^2 - 11x + 14 = (2x + 1)(x - 2)\)  
66. \((3x + 10)(3x - 2) = (x + 3)(3x + 10)\)

67. \(4x^3 + 10x^2 - 50x = 0\)

Reduce the following rational expressions to lowest terms.

68. \(\frac{27x^3y}{18x^2y^4}\)  
69. \(\frac{x^2 + 4x + 3}{x^2 - 1}\)  
70. \(\frac{3 - x}{3x^2 - 5x - 12}\)

Perform the indicated operations, and reduce the answers to lowest terms.

71. \(\frac{8x^3}{5x^2} \cdot \frac{10x^3}{12x^4}\)  
72. \(\frac{2x^2 + x}{4x + 8} \cdot \frac{2x^2 + 6x}{x^3 + 3x^2}\)  
73. \(\frac{3x^2 - 9xy}{6x^2 - 6y^2} \div \frac{x^3 - 3x^2y}{xy + y^2}\)

74. \(\frac{2x^2 + 8x}{2x^2 - 4x - 30} \div \frac{3x^2 - 2x}{3x^2 + 7x - 6}\)  
75. \(\frac{7x}{9} + \frac{5x}{9}\)  
76. \(\frac{6x - 5y}{2x - y} - \frac{4x - 4y}{2x - y}\)

77. \(\frac{x^2 + 3x + 5}{x^2 + 4x + 4} + \frac{x^2 - 3x - 13}{x^2 + 4x + 4}\)  
78. \(\frac{6x + 1}{3x - 4} - \frac{3x - 13}{4 - 3x}\)  
79. \(\frac{11x + 2}{2x - 4} - \frac{2x + 15}{2x - 4} - \frac{3x - 1}{2x - 4}\)
Given the following linear equations, complete the table of solution pairs.

80. \( 6x - 5y = 10 \)

<table>
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<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>2</td>
<td>2</td>
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81. \( 3x - 4y + 9 = 0 \)

<table>
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<th>( x )</th>
<th>( y )</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>5</td>
<td>0</td>
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</tbody>
</table>

82. \( x + y = 0 \)

<table>
<thead>
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<th>( y )</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>-5</td>
<td>5</td>
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</table>

Graph the solutions of the following linear equations. Indicate the intercept(s).

83. \( x + y = -3 \)

84. \( 3x - y = 9 \)

85. \( 5x - 4y = -20 \)

86. \( 4x + 3y = 24 \)

87. \( x = 2 \)

88. \( 3y + 6 = 0 \)

89. \( -x + y = -5 \)

90. \( 2x + y = 0 \)

91. \( -x - 2y = 4 \)
Determine the solutions of the following linear systems of equations. If there are no solutions, write *inconsistent*. If there are infinitely many solutions, write *dependent*.

92. \[ 3x - 7y = 8 \]
   \[ x = -2 \]

93. \[ x = 3y + 1 \]
   \[ 2x - 5y = 3 \]

94. \[ 3x + 8y = 1 \]
   \[ x + y = 2 \]

95. \[ 2x - 6y = 4 \]
   \[ -x + 3y = -2 \]

96. \[ 6x - y = -1 \]
   \[ 3x + 2y = 12 \]

97. \[ 5x + y = -14 \]
   \[ 2x - y = -7 \]

98. \[ -3x + 7y = -7 \]
   \[ 3x + 2y = 25 \]

99. \[ 6x - 4y = 10 \]
   \[ -3x + 2y = -4 \]

100. \[ 11x + 10y = 38 \]
    \[ 4x + 11y = 31 \]

Simplify the following radicals, if possible. Assume all variables represent positive numbers.

101. \[ \sqrt{49} \]

102. \[ \sqrt{\frac{100}{9}} \]

103. \[ \frac{3}{\sqrt{125}} \]

104. \[ \sqrt{63} \]

105. \[ \sqrt{13x^{10}} \]

106. \[ \sqrt{80x^4y^7} \]

107. \[ \sqrt{275x^{11}y^{25}} \]

108. \[ \sqrt{\frac{11}{144}} \]

109. \[ \sqrt{\frac{99x^{16}}{16}} \]

Solve the following equations.

110. \[ \frac{3x}{5} - \frac{x}{2} = \frac{7}{10} \]

111. \[ \frac{x + 4}{x - 1} = \frac{6}{x - 3} \]

112. \[ \frac{x}{x + 1} - \frac{5}{x - 3} = \frac{-20}{x^2 - 2x - 3} \]