Math 96 Exam 3 Study Guide

Exam will consist of a sampling of questions similar to the ones below

Section 5.1

1. Simplify: \( \frac{x^2 + 9x + 8}{x^2 + 8x} \)

2. Simplify: \( \frac{x^2 - 3x - 4}{x^2 + 2x - 24} \)

3. Perform the operation and simplify your answer as much as possible:
   \[ \frac{x^2 - 2x - 3}{x - 2} \cdot \frac{x + 3}{x^2 + x} \]

4. Perform the operation and simplify your answer as much as possible:
   \[ \frac{4x + 4}{x^2 - 5x + 6} \cdot \frac{x - 3}{x + 1} \]

5. Perform the operation and simplify your answer as much as possible:
   \[ \frac{x^2 + 2x}{x + 1} \cdot \frac{x - 1}{x^2 - 4} \]

6. Perform the operation and simplify your answer as much as possible:
   \[ \frac{10x^2 + 17x + 3}{5x + 10} \cdot \frac{x + 2}{5x^2 + 36x + 7} \]

7. Perform the operation and simplify your answer as much as possible:
   \[ \frac{x^2 - 3x + 2}{x^2 - 9} \cdot \frac{x - 3}{x^2 + 2x - 3} \]

8. Perform the operation and simplify your answer as much as possible:
   \[ \frac{3x^2 - 19x - 14}{5x^2 + 7x + 2} \cdot \frac{5x + 2}{x^2 - 49} \]

9. Perform the operation and simplify your answer as much as possible:
   \[ \frac{5x - 30}{4x - 32} \div \frac{x^2 - 6x}{x - 8} \]

10. Perform the operation and simplify your answer as much as possible:
    \[ \frac{x^3}{x^2 - 4} \div \frac{x^2}{4x + 8} \]

11. Perform the operation and simplify your answer as much as possible:
    \[ \frac{x^2 + 3x + 2}{4x - 8} \div \frac{x^2 + 4x + 3}{x - 2} \]
12. Perform the operation and simplify your answer as much as possible:
\[
\frac{x^2 - 3x - 18}{x^2 - 10x + 21} \div \frac{x^2 + 7x + 12}{x^2 - 5x - 14}
\]

13. Perform the operations and simplify your answer as much as possible:
\[
\frac{5x}{x^2 + 5x + 4} \div \frac{x^2 - 6x - x - 6}{x^2 - 1} \cdot \frac{x - 6}{x - 1}
\]

**Section 5.2**

14. Perform the operation and simplify your answer as much as possible:
\[
\frac{7}{x + 4} + \frac{3x + 5}{x + 4}
\]

15. Perform the operation and simplify your answer as much as possible:
\[
\frac{x - 5}{x^2 + 6x + 8} + \frac{x + 9}{x^2 + 6x + 8}
\]

16. Perform the operation and simplify your answer as much as possible:
\[
\frac{x^2 - 2x}{x + 2} + \frac{x - 6}{x + 2}
\]

17. Perform the operation and simplify your answer as much as possible:
\[
\frac{7}{x - 1} - \frac{8}{1 - x}
\]

18. Perform the operation and simplify your answer as much as possible:
\[
\frac{6}{4 - 7x} + \frac{x - 4}{7x - 4}
\]

19. Perform the operation and simplify your answer as much as possible:
\[
\frac{x^2 - 4x}{x^2 - 16} + \frac{7x - 4}{x^2 - 16}
\]

20. Perform the operation and simplify your answer as much as possible:
\[
\frac{4x}{4x - 12} + \frac{x}{3x - 9}
\]

21. Perform the operation and simplify your answer as much as possible:
\[
\frac{3}{x^2 - 16} - \frac{2}{x + 4}
\]

22. Perform the operation and simplify your answer as much as possible:
\[
\frac{x - 2}{x^2 - 7x + 6} + \frac{x}{x - 1}
\]

23. Perform the operation and simplify your answer as much as possible:
\[
\frac{x}{x - 5} - \frac{4}{x + 4}
\]
24. Perform the operation and simplify your answer as much as possible:
\[
\frac{x + 5}{3x - 9} + \frac{x + 1}{2x - 12}
\]

25. Perform the operation and simplify your answer as much as possible:
\[
\frac{2x}{x^2 - 16} + \frac{x}{x - 4}
\]

26. Perform the operation and simplify your answer as much as possible:
\[
\frac{1}{x + 1} - \frac{2x - 1}{x^2 - 2x - 3}
\]

27. Perform the operation and simplify your answer as much as possible:
\[
\frac{5x}{x^2 + 8x + 15} + \frac{2}{x^2 + 14x + 45}
\]

28. Perform the operation and simplify your answer as much as possible:
\[
\frac{3}{2x^2 - 9x + 9} - \frac{1}{2x^2 - 7x + 6}
\]

Section 5.3

29. Simplify the complex fraction:
\[
\frac{\frac{5y}{12x^2}}{\frac{5y^2}{3x^4}}
\]

30. Simplify the complex fraction:
\[
\frac{\frac{5x^2}{x^2 - 3}}{\frac{3y^3}{x + 3}}
\]

31. Simplify the complex fraction:
\[
\frac{7 - \frac{5}{3x}}{2 - \frac{5}{3x}}
\]

32. Simplify the complex fraction:
\[
\frac{1 - \frac{1}{x^2}}{1 + \frac{1}{x}}
\]

33. Simplify the complex fraction:
\[
\frac{\frac{1}{5} + \frac{1}{x}}{\frac{x^2 - 25}{3x^2}}
\]

34. Simplify the complex fraction:
\[
\frac{x^{-1} + 5}{x^{-1} - 2}
\]

35. Simplify the complex fraction:
\[
\frac{8 + \frac{8}{x + 1}}{8 - \frac{5}{x}}
\]

36. Simplify the complex fraction:
\[
\frac{\frac{6}{x - 4} - \frac{3}{x + 2}}{\frac{4}{x + 2} - \frac{1}{x - 4}}
\]
Section 5.4

37. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{30}{x - 2} = \frac{20}{x}
\]

38. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{x}{5x - 18} = \frac{3}{x}
\]

39. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{-3}{x + 8} = \frac{x}{x + 6}
\]

40. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{7x + 5}{3} - \frac{2x + 7}{7} = 15
\]

41. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{3}{5x} + \frac{2}{7x} = \frac{1}{5}
\]

42. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{x + 3}{2x} - \frac{3}{2x} = 0
\]

43. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{2}{x} + \frac{1}{6} = \frac{5}{6x} - \frac{1}{2}
\]

44. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{x + 6}{x + 5} - \frac{x - 1}{x - 5} = 1
\]

45. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{4}{x + 7} - \frac{7}{x^2 + 6x - 7} = 5
\]

46. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{3}{x^2 - 13x + 40} = \frac{1}{x - 8} + \frac{4}{x - 5}
\]

47. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{-11x}{x^2 - x - 30} - \frac{8}{x - 6} = \frac{x}{x + 5}
\]

48. Solve for $A$
\[
\frac{5}{1 - A} = P
\]
49. Solve for $y$

$$\frac{y - u}{b + E} = T$$

50. Salma drove 420 miles using 18 gallons of gas. At this rate, how many gallons of gas would she need to drive 357 miles?

51. Suppose that 12 inches of wire costs 60 cents. At the same rate, how much will 7 inches of wire cost?

Section 5.6

52. Suppose that $y$ varies directly with $x$, and $y = 2$ when $x = 16$. Find $y$ when $x = 7$

53. Suppose that $y$ varies inversely with $x$, and $y = 6$ when $x = 3$. Find $y$ when $x = 9$

54. Suppose that $y$ varies inversely with $x^2$, and $y = 10$ when $x = 4$. Find $y$ when $x = 10$

55. Suppose that $y$ is directly proportional to $x^2$, and $y = 36$ when $x = 3$. Find $y$ when $x = 2$

56. Suppose that $z$ varies jointly with $x$ and $y$, and $z = 45$ when $x = 3$ and $y = 1$. Find $z$ when $x = 5$ and $y = 2$.

57. Suppose that $z$ varies directly with $y$ and inversely with $x$, and $z = 10$ when $y = 20$ and $x = 4$. Find $z$ when $x = \frac{1}{2}$ and $y = 10$.

Section 6.1

58. Simplify: $\sqrt{63}$

59. Simplify: $-\sqrt{300}$

60. Simplify: $\sqrt[3]{250}$

61. Simplify: $\sqrt{-64}$

62. Simplify: $\sqrt{24v^{14}u^6}$

63. Simplify: $\sqrt{18t^8u^6}$

64. Simplify: $\sqrt{x^7t^9w}$

65. Simplify: $\sqrt{16y^4}$

66. Simplify: $-\sqrt{25x^{12}}$

67. Simplify: $\sqrt{20x^2y^{16}}$

68. Simplify: $\sqrt[3]{48x^3y}$
69. Simplify: $\sqrt[3]{27x^9y^{12}}$

70. Simplify: $\frac{6 - \sqrt{45}}{3}$

71. Simplify: $\frac{4 + \sqrt{8}}{8}$

**Section 6.2**

72. Evaluate: $36^{\frac{1}{2}}$

73. Evaluate: $125^{-\frac{1}{3}}$

74. Evaluate: $-81^{\frac{1}{2}}$

75. Evaluate: $\left(\frac{-25}{49}\right)^{\frac{1}{2}}$

76. Evaluate: $\left(\frac{4}{81}\right)^{\frac{1}{2}}$

77. Evaluate: $4^{\frac{5}{2}}$

78. Evaluate: $(-64)^{\frac{1}{3}}$

79. Evaluate: $\left(\frac{1}{27}\right)^{-\frac{1}{3}}$

80. Evaluate: $-(81)^{-\frac{3}{4}}$

81. Evaluate: $\left[(25)^{\frac{1}{2}}\right]^{-3}$

82. Simplify and use only positive exponents in your answer: $\left(3x^{\frac{1}{2}}\right)^3$

83. Simplify and use only positive exponents in your answer: $(25x^{10})^{\frac{1}{2}}$

84. Simplify and use only positive exponents in your answer: $x^{\frac{3}{4}} \cdot x^{4}$

85. Simplify and use only positive exponents in your answer: $\frac{x^2}{x^{\frac{3}{4}}}$

86. Simplify and use only positive exponents in your answer: $\frac{x^{\frac{4}{3}} \cdot x}{x^{\frac{7}{3}}}$

87. Simplify and use only positive exponents in your answer: $\frac{a^{-\frac{1}{2}} \cdot b^{\frac{3}{2}}}{a^{\frac{1}{4}} \cdot b^{\frac{1}{2}}}$

88. Simplify and use only positive exponents in your answer: $\left(2y^{-\frac{4}{3}} z^{\frac{1}{2}}\right)^{-4}$
89. Simplify and write your answer in simplified radical form: $\sqrt{w} \cdot \sqrt{w^7}$

90. Simplify and write your answer in simplified radical form: $\left(\sqrt[5]{w^3y^7}\right)^{10}$

**Section 6.3**

91. Simplify: $8\sqrt[3]{2x^2} + 4\sqrt[3]{2x^2} - \sqrt[3]{2x^2}$

92. Simplify: $\sqrt{98} - 3\sqrt{72}$

93. Simplify: $8\sqrt{28} + 5\sqrt{63}$

94. Simplify: $2\sqrt{45} + 3\sqrt{5} - \sqrt{20}$

95. Simplify: $\sqrt[3]{18x^2y} - 2\sqrt[3]{8x^2y} + 5\sqrt[3]{2x^2y}$

96. Simplify: $3\sqrt[3]{24} + 7\sqrt[3]{81} - 4\sqrt[3]{16}$

97. Simplify: $5x\sqrt[3]{3x^3} + \sqrt[3]{27x^5} - 2x\sqrt[3]{12x^3}$

98. Simplify: $(4 + \sqrt{3})(6 - \sqrt{3})$

99. Simplify: $(8 + \sqrt{6x})(5 + \sqrt{6x})$

100. Simplify: $(5\sqrt{3} + \sqrt{2})^2$

101. Simplify: $(2\sqrt{7} + \sqrt{5})(2\sqrt{7} - \sqrt{5})$

102. Simplify: $(\sqrt{x} - 3\sqrt{y})^2$

103. Rationalize the denominator and simplify if possible: $\frac{\sqrt{15}}{\sqrt{30}}$

104. Rationalize the denominator and simplify if possible: $\frac{\sqrt{4}}{\sqrt{6}}$

105. Rationalize the denominator and simplify if possible: $\frac{5}{6 - \sqrt{2}}$

106. Rationalize the denominator and simplify if possible: $\frac{3}{\sqrt{3} + \sqrt{2}}$

107. Rationalize the denominator and simplify if possible: $\frac{2\sqrt{7} + 3}{\sqrt{7} + 2}$

108. Rationalize the denominator and simplify if possible: $\frac{\sqrt{11} + \sqrt{2}}{\sqrt{11} - \sqrt{2}}$
109. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{2x + 18} = 4 \]

110. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{3 - 3x} = 6 \]

111. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{2x + 13} = \sqrt{3x + 7} \]

112. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{7 - 4x} = \sqrt{15 - 6x} \]

113. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{36 - 7x} = x - 4 \]

114. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{x^2 - 5} = 2 \]

115. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt{x - 10} = -7 \]

116. Solve for $x$. If there is no solution, write “No Solution”:
\[ x - 3 - \sqrt{21 - 2x} = 0 \]

117. Solve for $x$. If there is no solution, write “No Solution”:
\[ x = \sqrt{-9x + 55} + 5 \]

118. Solve for $x$. If there is no solution, write “No Solution”:
\[ 3 + \sqrt{x} = \sqrt{x + 27} \]

119. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt[3]{x - 5} = 4 \]

120. Solve for $x$. If there is no solution, write “No Solution”:
\[ \sqrt[4]{2x - 11} = 3 \]
Section 2.4 and 6.5

121. Given \( f(x) = \sqrt{x + 4} \), evaluate \( f(21) \), \( f(45) \) and \( f(-4) \)

122. Given \( f(x) = \sqrt{2x - 2} \), evaluate \( f(1) \), \( f(-3) \), and \( f(33) \)

123. Given \( f(x) = -2x + 7 \), evaluate \( f(-1) \), \( f(-5) \), and \( f(10) \)

124. Given \( f(x) = x^2 - 6x - 1 \), evaluate \( f(-2) \), \( f(2) \), and \( f(-7) \)

125. Write the domain of \( y = \sqrt{4x + 4} \) in interval notation.

126. Write the domain of \( y = -2x + 10 \) in interval notation.

127. Write the domain of \( y = \sqrt{3x - 9} \) in interval notation.

128. Write the domain of \( y = \frac{3}{5x + 2} \) in interval notation.

129. Write the domain of \( y = \sqrt{6 - 2x} \) in interval notation.

130. Write the domain of \( y = \frac{x^2 - 7x + 6}{x - 7} \) in interval notation.

131. Write the domain of \( y = \sqrt{4x - 8} \) in interval notation.