Math 96 Exam 3 Study Guide
Exam will consist of a sampling of questions similar to the ones below

**Rational Expressions:**

1. Simplify: \( \frac{6(3x + 7)(x - 2)}{18(x + 3)(3x + 7)} \)
2. Simplify: \( \frac{9y^2 - 15y}{3x^2 - 21x} \)
3. Simplify: \( \frac{2x - 5}{5 - 2x} \)
4. Simplify: \( \frac{v - 2}{v^2 - 4} \)
5. Simplify: \( \frac{x^2 - 6x - 7}{x - 7} \)
6. Simplify: \( \frac{x^2 - 9x + 20}{3x^2 - 48} \)
7. Simplify: \( \frac{4u^2 - 32u + 28}{u^2 - 9u + 8} \)
8. Find the least common denominator of: \( \frac{9x}{x - 7} \) and \( \frac{5x}{x + 6} \)
9. Find the least common denominator of: \( \frac{-2}{x + 4} \) and \( \frac{3x}{2x + 8} \)
10. Find the least common denominator of: \( \frac{x}{x^2 - x - 12} \) and \( \frac{3x}{x^2 - 16x + 48} \)

**Rational Operations:**

11. Perform the operation and simplify your answer as much as possible:
\[
\frac{2}{3x + 9} \cdot \frac{9x + 27}{5}
\]
12. Perform the operation and simplify your answer as much as possible:
\[
\frac{8x - 40}{28x + 35} \cdot \frac{4x + 5}{4x - 20}
\]
13. Perform the operation and simplify your answer as much as possible:
\[
\frac{x + 1}{x^2 + 2x - 3} \cdot \frac{4x + 12}{x + 2}
\]
14. Perform the operation and simplify your answer as much as possible:
\[
\frac{4y - 8}{y^2 - 2y - 3} \cdot \frac{y^2 - y - 6}{y - 2}
\]
15. Perform the operation and simplify your answer as much as possible:
\[
\frac{2x - 8}{3} \div \frac{6x - 24}{9}
\]

16. Perform the operation and simplify your answer as much as possible:
\[
\frac{2x + 12}{9x - 2} \div \frac{x + 6}{3x - 6}
\]

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

18. Perform the operation and simplify your answer as much as possible:
\[
\frac{w^2 + 2w - 3}{w - 3} \div \frac{4w - 4}{3w - 9}
\]

19. Perform the operation and simplify your answer as much as possible:
\[
\frac{8}{a} - \frac{3}{a}
\]

20. Perform the operation and simplify your answer as much as possible:
\[
-\frac{2x - 2y}{4y} + \frac{2x - 11y}{4y}
\]

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

22. Perform the operation and simplify your answer as much as possible:
\[
\frac{8z - 7}{9z} + \frac{7z + 1}{9z}
\]

23. Perform the operation and simplify your answer as much as possible:
\[
\frac{x^2 - 5x}{x + 5} + \frac{7x - 15}{x + 5}
\]

24. Perform the operation and simplify your answer as much as possible:
\[
\frac{x^2 - 3x}{x^2 - 8x + 16} - \frac{4}{x^2 - 8x + 16}
\]

25. Perform the operation and simplify your answer as much as possible:
\[
\frac{9}{2} - \frac{7}{5b}
\]

26. Perform the operation and simplify your answer as much as possible:
\[
\frac{y}{9} - \frac{5}{7}
\]

27. Perform the operation and simplify your answer as much as possible:
\[
\frac{7}{8x} - \frac{5}{3x}
\]
28. Perform the operation and simplify your answer as much as possible:
\[
\frac{9y - 4}{6y} - \frac{4y - 1}{3y}
\]

29. Perform the operation and simplify your answer as much as possible:
\[
\frac{5x + 3}{6x} - \frac{2x + 1}{8x}
\]

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

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

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

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

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

35. Perform the operation and simplify your answer as much as possible:
\[
\frac{8}{x - 7} + \frac{x - 4}{x - 3}
\]

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

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

38. Perform the operation and simplify your answer as much as possible:
\[
\frac{x - 1}{x + 2} - \frac{4x - 7}{5x + 10}
\]

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

40. Perform the operation and simplify your answer as much as possible:
\[
\frac{2}{x^2 + 4x - 5} - \frac{1}{x^2 + 7x + 10}
\]
41. Solve for $u$, If there is no solution, write “No Solution”:
$$\frac{6}{u} = -9$$

42. Solve for $y$, If there is no solution, write “No Solution”:
$$\frac{10}{y} = \frac{11}{8}$$

43. Solve for $x$, If there is no solution, write “No Solution”:
$$\frac{x + 4}{10} = \frac{7}{8}$$

44. Solve for $w$, If there is no solution, write “No Solution”:
$$\frac{8}{w + 4} = \frac{6}{7}$$

45. Solve for $x$, If there is no solution, write “No Solution”:
$$\frac{9}{x - 1} = \frac{6}{x}$$

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

47. Solve for $b$, If there is no solution, write “No Solution”:
$$3 = 8 - \frac{3}{2b}$$

48. Solve for $y$, If there is no solution, write “No Solution”:
$$1 + \frac{8}{y} = \frac{5}{3}$$

49. Solve for $u$, If there is no solution, write “No Solution”:
$$\frac{7}{6u} + \frac{5}{u} = 1$$

50. Solve for $x$, If there is no solution, write “No Solution”:
$$\frac{12}{7x} = \frac{1}{14} - \frac{5}{2x}$$

51. Solve for $y$, If there is no solution, write “No Solution”:
$$2 + \frac{5}{y - 6} = \frac{3}{y - 6}$$

52. Solve for $x$, If there is no solution, write “No Solution”:
$$\frac{4}{x + 4} = \frac{8}{2x + 8} - 3$$

53. Solve for $y$, If there is no solution, write “No Solution”:
$$\frac{3}{2y - 6} - 2 = -\frac{5}{y - 3}$$
54. Solve for $y$, If there is no solution, write “No Solution”:
\[
\frac{8}{y^2 - 6y + 8} = \frac{1}{y - 4} + \frac{5}{y - 2}
\]

55. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{1}{x - 4} + \frac{5}{x + 4} = \frac{2}{x^2 - 16}
\]

56. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{-3}{x - 7} = \frac{x}{x - 4}
\]

57. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{2}{x} = \frac{x}{5x - 12}
\]

58. Solve for $u$, If there is no solution, write “No Solution”:
\[
\frac{2}{(u + 1)(u - 1)} = \frac{1}{u - 1} - 3
\]

59. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{5}{x - 2} + 6 = \frac{4}{x + 1}
\]

60. Solve for $u$, If there is no solution, write “No Solution”:
\[
u + 5 + 1 = \frac{u - 4}{u - 2}
\]

61. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{9}{x - 8} + \frac{x}{x - 2} = \frac{-6}{x^2 - 10x + 16}
\]

62. Solve for $x$, If there is no solution, write “No Solution”:
\[
\frac{x}{x + 6} = \frac{x + 18}{x^2 - 36} - \frac{2}{x - 6}
\]

Variation:

63. Suppose that $y$ varies directly with $x$, and $y = 24$ when $x = 15$.
Write a direct variation equation that relates $x$ and $y$.

64. Suppose that $y$ varies directly with $x$, and $y = 20$ when $x = 8$.
Find $y$ when $x = 3$

65. Lucy’s earnings vary directly with the number of hours she works. Suppose that she worked 6 hours yesterday and earned $72. How much will she earn today if she works 9 hours?

66. Suppose that $y$ varies inversely with $x$, and $y = 9$ when $x = 2$.
Write an inverse variation equation that relates $x$ and $y$

67. Suppose that $y$ varies inversely with $x$, and $y = 3$ when $x = 8$.
Find $y$ when $x = 15$