

Math 110
Cumulative Review
Miller/O'Neill Text

1. Find an equation of a line passing through $(-2, 4)$ and perpendicular to the line $x + 3y = 4$.
2. Solve the system:
$$\begin{aligned} 2x + 3y - 4z &= 17 \\ x - 2y + z &= -5 \\ 3x + 4y - 3z &= 21 \end{aligned}$$
3. Solve the system:
$$y = \frac{1}{3}x + 4$$

$$-x + 3y = 6$$
4. State the domain and range of the relation: $\{(4, 2), (3, -6), (2, 2), (4, 5), (4, 1)\}$
5. Simplify. Assume that x can be any real number. $\sqrt[4]{x^4}$
6. Find the domain: $g(x) = \sqrt{2x - 6}$
7. Simplify: $\left(\frac{x^{\frac{1}{3}} y^{\frac{5}{6}}}{x^{\frac{-1}{3}} y^{\frac{1}{6}}} \right)^{12}$
8. Simplify: $\sqrt[3]{16x^5 y^{12}}$
9. Rationalize the denominator: $\frac{2}{\sqrt{2x}}$
10. Solve: $\sqrt{4x + 2} + 5 = 3$
11. Simplify: $3i^4 - 2i^2 + 5i - 1$
12. Divide and write the answer in the form $a + bi$. $\frac{-6}{3 - 7i}$
13. Solve by completing the square and applying the square root property:
 $x^2 + 6x = 5$

14. Solve by using the quadratic formula: $2x(x-5) + 7x = -2$

15. Simplify: $\frac{\frac{1}{y} - \frac{y}{x^2}}{\frac{1}{x} + \frac{1}{y}}$

16. Solve: $\frac{x+5}{x-2} = \frac{5}{x+2} + \frac{28}{x^2-4}$

17. Solve: $-3x + 2 \leq 4$ or $2x + 3 \leq -5$

18. Solve: $-3x + 2 \leq 4$ and $2x + 3 \leq -5$

19. Solve: $|2x-3| = |x+5|$

20. Solve: $|x-5| < 10$

21. Graph the inequality: $2x + y \geq 3$

22. A collection of dimes and quarters has a total value of \$2.45. If there are 17 coins, how many of each type are there?

23. Solve: $\sqrt[3]{2x-5} = -3$

24. Multiply: $6i(4 + 5i)$

25. Solve: $|x-9| - 3 \geq 7$

26. Simplify: $\frac{2^{\frac{2}{5}}c^{-\frac{1}{4}}d^{\frac{1}{5}}}{2^{\frac{8}{5}}c^{\frac{3}{4}}d^{\frac{1}{10}}}$

27. Find an equation of a line parallel to the y-axis and passing through the point (2, 6).

28. Find an equation of a line perpendicular to the y-axis and passing through the point (2, 6).

29. Find an equation of a line perpendicular to the line $2x + y = 4$ and passing through the point (2, 6).

30. Perform the indicated operations: $\frac{x}{x-y} + \frac{y}{y-x} + x$
31. Given the equation: $\frac{2}{x-4} = \frac{5}{x+2}$ Are there any restrictions on x for which the rational expressions are undefined?
32. Solve the equation: $\frac{2}{x-4} = \frac{5}{x+2}$
33. Solve the inequality: $2 | x-3 | + 1 > -7$
34. Given: $A = \{2, 4, 6, 8, 10\}$ and $B = \{2, 8, 12, 16\}$ What is $A \cup B$?
35. Given: $A = \{2, 4, 6, 8, 10\}$ and $B = \{2, 8, 12, 16\}$ What is $A \cap B$?
36. Multiply: $(\sqrt[3]{x} + \sqrt[3]{2})(\sqrt[3]{x^2} - \sqrt[3]{2x} + \sqrt[3]{4})$
37. What number would have to be added to $x^2 + 10x$ to make it a perfect square trinomial?
38. Perform the indicated operations and simplify: $\sqrt{3}(\sqrt{5} + \sqrt{6} + \sqrt{3})$
39. Simplify: $\sqrt[4]{\frac{1}{16}} - \sqrt[3]{\frac{8}{27}}$
40. Simplify: $4\sqrt{45b^3} + 5b\sqrt{80b}$
41. Simplify: $\frac{-8}{y^2-1} + \frac{4y}{y-1}$
42. Simplify: $\frac{2t^2 + 9t + 4}{t^2 - 16} \cdot \frac{t^2 - 4t}{2t^2 - 5t - 3}$
43. Write in standard form, $a + bi$: $(-3 + 5i) - (4 + 7i)$
44. Simplify: i^{20}
45. Solve: $2 | 3 - p | - 4 = 2$
46. Solve: $2 | 3 - p | - 4 < 2$
47. Solve: $2 | 3 - p | - 4 > 2$

48. Determine algebraically whether the lines are parallel, perpendicular or neither.

$$4x - 2y = 5$$

$$-3x + 6y = 10$$

49. Simplify: $\frac{x^{-1} - y^{-1}}{y^{-2} - x^{-2}}$

50. How many gallons of a 15% antifreeze solution should be mixed with a 60% antifreeze solution to produce 60 gallons of a 45% antifreeze solution?

51. Given $f(x) = \frac{1}{2}x - 1$ and $g(x) = 3x^2 - 2x$

a. Find $f(4)$

b. Find $g(-3)$

52. Find the x- and y-intercepts of $3x + 7y = 9$

53. Simplify: $\frac{2}{y^2 + 4y + 3} + \frac{1}{3y + 9}$

54. Simplify: $\frac{9 - b^2}{5b + 15} \div \frac{b - 3}{b + 3}$

55. Simplify: $\frac{w^2 - 4w}{w^2 - 8w + 16} \cdot \frac{w - 4}{w^2 + w}$

56. Simplify: $\frac{t}{t - 2} - \frac{8}{t^2 - 4}$

57. Simplify: $\frac{1}{x + 4} + \frac{2}{x^2 + 2x - 8} + \frac{x}{x - 2}$

58. A recipe for vegetable soup calls for $\frac{1}{2}$ cup of carrots for six servings. How many cups of carrots are needed to prepare 15 servings?

59. A motorboat can travel 28 miles downstream in the same amount of time as it can travel 18 miles upstream. Find the speed of the current if the boat can travel 23 mph in still water.

60. Two printers working together can complete a job in 2 hr. If one printer requires 6 hr to do the job alone, how many hours would the second printer need if working alone?
61. To attend a State fair, the cost is \$10 per person to cover exhibits and musical entertainment. There is an additional cost of \$1.50 per ride.
- Write an equation that gives the total cost, y of visiting the State Fair and going on x rides.
 - Use the equation from part (a) to determine the cost of going to the State Fair and going on 10 rides.
62. Multiply: $(\sqrt{2x} - 3)^2$
63. What is the vertex of $f(x) = -2(x - 5)^2 - 5$? Is it a maximum or a minimum?
64. Solve by completing the square and applying the square root property:
 $3x^2 + 2x - 1 = 0$

Answers

1. $y = 3x + 10$

2. $(2, 3, -1)$

3. no solution

4. domain: $\{4, 3, 2\}$
range: $\{2, -6, 5, 1\}$

5. $|x|$

6. $[3, \infty)$

7. x^8y^8

8. $2xy^4\sqrt[3]{2x^2}$

9. $\frac{\sqrt{2x}}{x}$

10. no solution

11. $4 + 5i$

12. $-\frac{9}{29} - \frac{21}{29}i$

13. $x = -3 \pm \sqrt{14}$

14. $x = \frac{3 \pm i\sqrt{7}}{4}$

15. $\frac{x-y}{x}$

16. $x = -4$

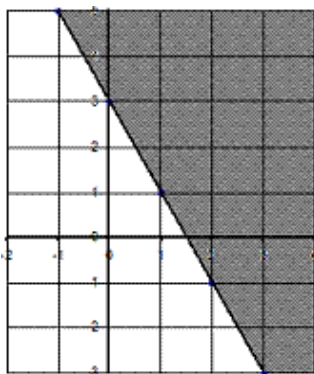
17. $(-\infty, -4] \cup [-\frac{2}{3}, \infty)$

18. no solution

19. $x = 8, x = -\frac{2}{3}$

20. $(-5, 15)$

21.



22. 12 dimes,
5 quarters

23. $x = -11$

24. $-30 + 24i$

25. $(-\infty, -1] \cup [19, \infty)$

26. $\frac{4d^{10}}{c}$

27. $x = 2$

28. $y = 6$

29. $y = \frac{1}{2}x + 5$

30. $x + 1$

31. Yes; $x \neq 4, x \neq -2$

32. $x = 8$

33. $(-\infty, \infty)$

34. $\{2, 4, 6, 8, 10, 12, 16\}$

35. $\{2, 8\}$

36. $x + 2$

37. 25

38. $\sqrt{15} + 3\sqrt{2} + 3$

39. $-\frac{1}{6}$

40. $32b\sqrt{5b}$

41. $\frac{4(y+2)}{y+1}$

42. $\frac{t}{t-3}$

43. $-7 - 2i$

44. 1

45. $\{0, 6\}$

46. $(0, 6)$

47. $(-\infty, 0) \cup (6, \infty)$

48. neither

49. $-\frac{xy}{x+y}$

50. 20 gal of 15%;
40 gal of 60%

51. a. 1; b. 33

52. (3, 0) & (0, 9/7)

53. $\frac{y+7}{3(y+3)(y+1)}$

54. $-\frac{b+3}{5}$

55. $\frac{1}{w+1}$

56. $\frac{t+4}{t+2}$

57. $\frac{x(x+5)}{(x+4)(x-2)}$

58. $1\frac{1}{4}$ cups

59. 5 mph

60. 3 hr

61. a. $y = 1.5x + 10$
b. \$25

62. $2x - 6\sqrt{2x} + 9$

63. (5, -5); maximum

64. $\{-1, 1/3\}$