

Review for Final Examination
Intermediate Algebra – MAT 1033

The Final Exam for MAT 1033 will contain twenty-five questions: twenty-two free response questions, and five word problems of which the student must choose three and answer.

- I. Solve the following linear equations. Then state whether the equation is an identity, a conditional equation, or an inconsistent equation. (Chapter one).

1. $2 - 3(3m - 6) + 10m = -2(m - 7) + 4 + 3m$ 2. $\frac{3x}{5} - \frac{x-3}{2} = \frac{x+2}{3}$

- II. Simplify each of the following exponential expressions. (Chapter one).

3. $\left(\frac{2^{-1}x^{-2}y}{x^4y^{-1}} \right) \left(\frac{xy^{-3}}{x^{-3}y} \right)$ 4. $(-3m^2n^{-3})^{-2} (2mn^3)^4$

- III. For the given functions $f(x) = x^2 - 3x + 2$ and $g(x) = x - 4$ and $k(x) = \sqrt{4x - 3}$ find the following: (Chapters two & seven).

5. $f(-3) =$

6. $\frac{f(a+h) - f(a)}{h}$

7. $(f + g)(x) =$

8. $\left(\frac{f}{g} \right)(-2)$

9. $(f - g)(-1)$

- IV. Find the equation of the line in with the given conditions. Write the answer in:
a) Standard form, b) slope intercept form. (Chapter two).

10. Passes through the points $(-2, 3)$ and $(-3, 1)$.

11. Passes through the point $(4, -1)$ and it is perpendicular to $3x - 2y = 4$.

- V. Find the domain of the following functions. Leave answers in interval notation.
(Chapters two & six & seven).

12. $g(x) = \frac{x}{x-2}$

13. $f(x) = \sqrt{2x-1}$

VI. Solve the following inequalities. Graph the solution set on a number line and write the answer in interval notation. (Chapter four).

14. $4x - 3(x+4) \leq 1 + (-x+6)$ 15. $-2 < \frac{3-x}{5} \leq 1$

16. $|2x-1| > 2$ 17. $|2x-1| < -2$

VII. Find the solution set of the following equation. (Chapter four).

18. $|2x-1| - 5 = 2$ 19. $|2x-1| + 5 = 2$

VIII. Factor the following expressions completely. (5.3 - 5.6).

20. $2m^3 - 14m^2 + 24m$

21. $4x^2 + 9$

22. $27y^3 - 125$

23. $x^4 - 28x^2 + 75$

24. $x^2 - 100$

IX. Perform the indicated operations. (Chapter 6).

25. $\frac{x^2-9}{x^3-27} \div \frac{x^2+6x+9}{x^2+3x+9}$

26. $(y+1) \cdot \frac{y+2}{y^2+7y+6}$

27. $\frac{x-1}{x^2+2x+1} - \frac{3}{2x-2} + \frac{x}{x^2-1}$

28. $(4z^4 - 17z^2 + 14z - 3) \div (2z-1)$ perform long division

X. Simplify each of the following complex rational expressions. (Chapter 6).

29. $\frac{\frac{2}{x-1} + 2}{\frac{2}{x+1} - 2}$

30. $\frac{2a^{-1} + 3b^{-1}}{4a^{-2} - 9b^{-2}}$

XI. Solve each of the following rational equations. (Chapter 6).

31. $\frac{2}{x+3} - \frac{5}{x+1} = \frac{3x+5}{x^2+4x+3}$

32. $\frac{3z-2}{z+1} = 4 - \frac{z+2}{z-1}$

XII. Solve the following equations for the indicated variable. (Chapter 6).

33. $V = \frac{1}{3}\pi r^2 h$ for h

34. $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$ for q

XIII. Simplify each of the following expressions. Assume that all variables in a radical represent positive real numbers. (Chapter 7).

$$35. \sqrt[5]{64x^6y^{17}}$$

$$36. \sqrt[3]{-8x^5}$$

$$37. 6\sqrt{27x} - 2\sqrt{48x^3} + \sqrt{75x} - x\sqrt[3]{3x}$$

$$38. \frac{\sqrt[5]{96x^{12}y^{11}}}{\sqrt[5]{3x^2y^{-2}}}$$

$$39. \frac{2x^{2/3} \cdot x^{-1/2}}{(x^{1/4})^2}$$

XIV. Rationalize the denominator. Simplify if possible. (Chapter 7).

$$40. \frac{12}{\sqrt[3]{9m^2n^{10}}}$$

$$41. \frac{8}{2\sqrt{3}-\sqrt{2}}$$

XV. Solve each of the following equations. (Chapter 7).

$$42. \sqrt{5x-1} - \sqrt{x} = 1$$

$$43. \sqrt{y+1} + 2y = 8$$

XVI. Multiply the following. Simplify any radical expression that appears in the product. (Chapter 7).

$$44. (2\sqrt{3} - 7\sqrt{6})(3\sqrt{3} - \sqrt{6})$$

XVII. Perform the indicated operation(s) and write the result in the form $a + bi$. (Chapter 7).

$$45. (2 - 7i)(5 + 2i)$$

$$46. \frac{2 - 3i}{2 + i}$$

XVIII. Solve the following quadratic equations by the indicated method. (5.7, 8.1 - 8.3).

$$47. \frac{z^2}{6} - \frac{z}{2} - 3 = 0 \quad \text{factoring}$$

$$48. (2x - 3)^2 + 2 = 6 \quad \text{Square root property}$$

$$49. 2a^2 + 8a = -12 \quad \text{Completing the square}$$

$$50. 2x(x + 4) = 3x - 3 \quad \text{Quadratic formula}$$

XIX. Solve the following systems of equations by the method of your choice. (3.1).

$$51. \begin{cases} 2x + 3y = 3 \\ 5x + 2y = 13 \end{cases}$$

$$52. \begin{cases} 8x + 2y = 5 \\ y = 4x - 1 \end{cases}$$

XX. Graph the solution set of each of the following systems of inequalities or indicate that the system has no solution. (4.4)

$$53. \begin{cases} x + y > 3 \\ x + y < -2 \end{cases}$$

$$54. \begin{cases} 3x + y < 6 \\ x \geq -2 \\ y \leq 4 \end{cases}$$

XXI. Solve the following word problems.

55. John Walker made an extra \$8000 last year by selling toys he had made. He invested part of the money at 14% and the rest at 12%. His total annual income from interest was \$1060. How much was invested at each rate?
56. In a chemistry class, 5 liters of 4% silver iodide solution must be mixed with a 10% solution to get a 6% Solution. How many liters of the 10% solution are needed?
57. When 7 is added to the reciprocal of twice a number, the result is the reciprocal of four times the number. Find the number.
58. Chuck can paint a room in 8 hours when working alone. If Walt helps him, the total job takes 6 hours. How long will it take Walt if worked alone?
59. Jill and Russ agree to meet at the Reno airport. Jill travels 250 kilometers and Russ travels 300 kilometers. If Russ's speed is 200 kph greater than Jill's speed and they both spend the same amount of time traveling, at what speed does each travel?
60. A B-737 jet flies 445 miles with the wind and 355 miles against the wind in the same length of time. If the speed of the jet in still air is 400 mph, find the speed of the wind.
61. Suppose r varies directly as the square of m , and inversely as s . If $r = 12$ when $m = 6$ and $s = 4$, find r when $m = 4$ and $s = 10$.

ANSWER KEY FOR MAT 1033 FINAL EXAM REVIEW

1. No Solution, inconsistent equation

3. $\frac{1}{2x^2y^2}$

5. 20

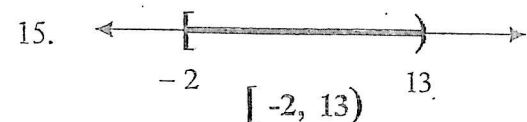
7. $x^2 - 2x - 2$

9. 11

11. a) $2x + 3y = 5$

b) $y = \frac{-2}{3}x + \frac{5}{3}$

13. Domain = $[1/2, \infty)$



17. A distance can't be less than -2, so \emptyset .

19. A distance can't equal -3, so \emptyset .

21. Prime

23. $(x^2 - 3)(x + 5)(x - 5)$

25. $\frac{1}{x+3}$

27. $\frac{x^2 - 8x - 1}{2(x+1)^2(x-1)}$

29. $\frac{-(x+1)}{(x-1)}$ or $\frac{-x-1}{x-1}$ or $\frac{x+1}{1-x}$

31. No Solution, because $x \neq -3$

2. $x = 25/7$, conditional equation

4. $\frac{16n^{18}}{9}$

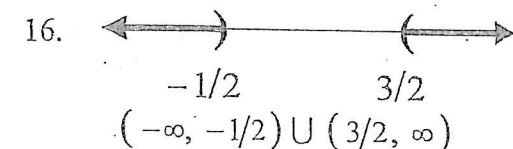
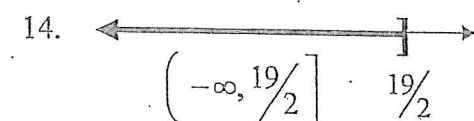
6. $2a + h - 3$

8. -2

10. a) $2x - y = -7$

b) $y = 2x + 7$

12. Domain = $(-\infty, 2) \cup (2, \infty)$



18. $x = \{-3, 4\}$

20. $2m(m-3)(m-4)$

22. $(3y-5)(9y^2 + 15y + 25)$

24. $(x+10)(x-10)$

26. $\frac{y+2}{y+6}$

28. $2z^3 + z^2 - 8z + 3$

30. $\frac{ab}{(2b-3a)}$

32. $z = 4$

$$33. h = \frac{3V}{\pi r^2}$$

$$35. 2xy^3 \sqrt[5]{2xy^2}$$

$$37. 23\sqrt{3x} - 8x\sqrt{3x} - x\sqrt[3]{3x}$$

$$39. \frac{2}{x^{1/3}}$$

$$41. \frac{4(2\sqrt{3} + \sqrt{2})}{5}$$

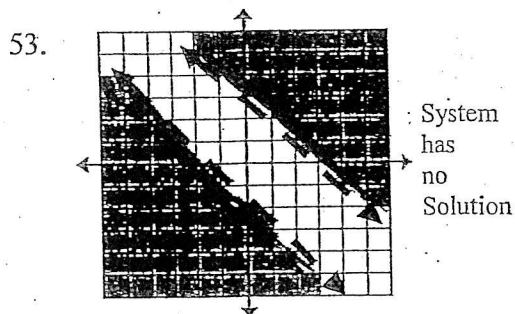
$$43. y = 3$$

$$45. 24 - 31i$$

$$47. z = -3, 6$$

$$49. a = -2 \pm \sqrt{2}i$$

$$51. (3, -1)$$



$$34. q = \frac{pf}{p - f}$$

$$36. -2x \sqrt[3]{x^2}$$

$$38. 2x^2y^2 \sqrt[5]{y^3}$$

$$40. \frac{4 \sqrt[3]{3mn^2}}{mn^4}$$

$$42. x = 1$$

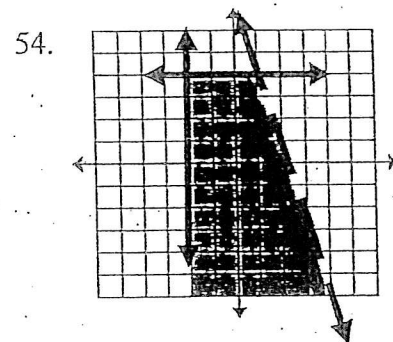
$$44. 60 - 69\sqrt{2}$$

$$46. \frac{1}{5} - \frac{8}{5}i$$

$$48. x = \frac{1}{2}, \frac{5}{2}$$

$$50. x = -\frac{3}{2}, -1$$

$$52. \left(\frac{7}{16}, \frac{3}{4}\right)$$



55. \$5000 was invested at 14%.
\$3000 was invested at 12%.

57. The number is $-\frac{1}{28}$.

59. Jill's speed is 1000 kmh.
Russ' speed is 1200 kmh.

61. $r = \frac{32}{15}$

56. 2.5 Liters of the 10% solution.

58. Walt would take 24 hours alone.

60. The wind speed is 45 mph.