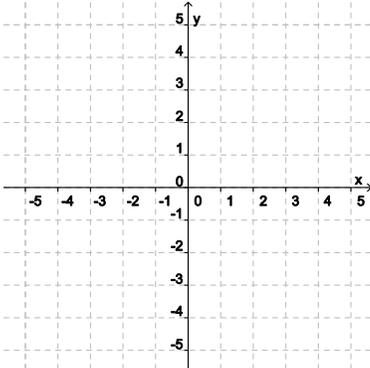


Note: Below are review exercises in the form of two practice final exams. It is important to understand that these review exercises are not guaranteed to cover all of the potential problems on the final exam. Please review the notes, practice problems, tests, and homework problems to fully prepare for the final exam. Now, take a deep breath, and dive into it! 😊

Sample Math 71B Final Exam #1

1. (2 points) Graph the equation $y = |x| - 2$. Be sure to plot the points on the graph at $x = -2, -1, 0, 1,$ and 2 .



2. (2 points) Solve $d = ab + bc$ for b .

3. (2 points) Given that $f(x) = -2x^2 + 1$, find $f(x - 1) - f(3x)$ and simplify.

4. Suppose $f(x) = \frac{2+x}{3}$ and $g(x) = 3x - 2$

a. (1 point) Find $\left(\frac{g}{f}\right)(0)$.

b. (1 point) Find $(f \circ g)(x)$.

c. (1 point) Find $(g \circ f)(x)$.

- d. (1 point) Are f and g inverse functions?

5. (3 points) Write the slope-intercept form of the equation for the line passing through $(1, 3)$ and perpendicular to the line whose equation is $3x + 2y = 6$.

6. (4 points) Solve the system. Write the solution as a set.

$$x + y + z = 5$$

$$2x + z = 8$$

$$3y + 2z = 5$$

7. Here's a linear inequality: $-3|x - 2| + 1 \leq -8$

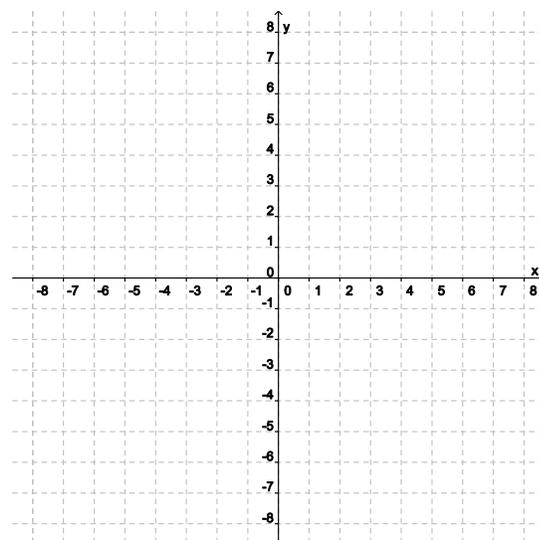
a. (2 points) Find the solution set of the following inequality (write your answer in either set-builder notation or interval notation).

b. (1 point) Graph the solution set on a number line.

8. (2 points) Graph the solution set of the following system of inequalities:

$$x - 2y \leq 4$$

$$2y \geq 4x - 2$$



9. (2 points) Factor completely, or state that the polynomial is prime: $-x^3 + 2x^2 + 4x - 8$

10. (2 points) Factor completely, or state that the polynomial is prime: $54 - 2y^3$

11. (2 points) The length of a rectangular carpet is 4 feet greater than twice its width. If the area is 48 square feet, find the carpet's length and width.

12. (3 points) Divide and simplify: $\frac{2y-2x}{15y^3} \div \frac{x^2-y^2}{3x^2+6xy+3y^2}$

13. (2 points) Simplify:

$$\frac{\frac{5y}{y^2-5y+6}}{\frac{3}{y-3} + \frac{2}{y-2}}$$

14. (2 points) Divide: $\frac{5x^4-2x^3+x^2+7x-12}{x^2-3}$

15. (3 points) Find the solution set for: $\frac{x}{x+1} + \frac{5}{x} = \frac{1}{x^2+x}$

16. (2 points) Working alone, you can mow the lawn in 3 hours. Working with your friend, you can do it in 2 hours. How long would it take your friend to do the job alone?

17. (1 point) Find the domain of $f(x) = \sqrt{4 - 2x}$. Write your answer using either set-builder notation or interval notation.

18. (1 point) Find the domain of $f(x) = \ln(3x + 2)$. Write your answer using either set-builder notation or interval notation.

19. (2 points) Simplify. Leave your answer using rational exponents.

$$\frac{\left(a^{-\frac{1}{2}}\right)^{\frac{1}{4}}}{a^{-\frac{5}{8}}}$$

20. (2 points) Simplify. Write your answer in radical notation.

$$\sqrt[3]{x^2} \cdot \sqrt[4]{x^2}$$

21. (2 points) Simplify. Assume all variables are positive real numbers.

$$\frac{\sqrt[3]{32xy^{10}}}{\sqrt[3]{2xy^2}}$$

22. (2 points) Rationalize the denominator. Simplify.

$$\frac{4}{\sqrt[3]{3x^2y}}$$

23. (2 points) Rationalize the denominator. Simplify.

$$\frac{\sqrt{2}-\sqrt{3}}{\sqrt{3}-3\sqrt{2}}$$

24. (3 points) Solve the radical equation.

$$x = \sqrt{x-1} + 3$$

25. (2 points) Write in $a + bi$ form.

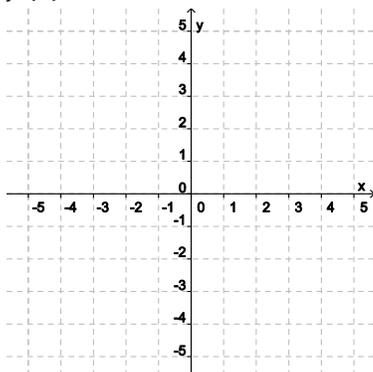
$$\frac{2-i}{3+2i}$$

26. (2 points) Solve the quadratic equation. Rationalize any denominators.

$$2x^2 = 3x - 2$$

27. (4 points) Find the vertex, x -intercepts, and y -intercept of the following quadratic function. Then graph it below.

$$f(x) = x^2 - 2x - 3$$



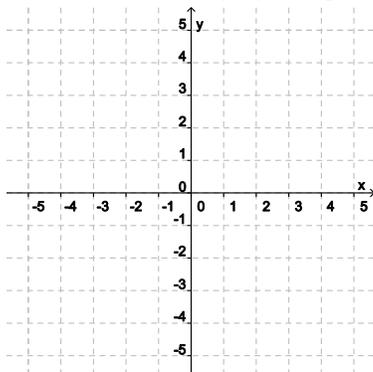
28. (3 points) Solve the following equation.

$$x^{\frac{2}{3}} - 5x^{\frac{1}{3}} + 6 = 0$$

29. (3 points) Solve the inequality and graph the solution set on a real number line.

$$x^2 - 3x - 3 > 1$$

30. (3 points) Graph the functions $f(x) = 3^x$ and $g(x) = 3^{x-2}$ in the same rectangular coordinate system. Then describe how the graph of g is related to the graph of f .



31. (3 points) A field bordering a straight stream is to be enclosed. The side bordering the stream is not to be fenced. If 100 yards of fencing material is to be used, what are the dimensions of the largest rectangular field that can be fenced?

32. (2 points) Find an equation for $f^{-1}(x)$ (the inverse function).

$$f(x) = \frac{1}{2}x + 3$$

33. Evaluate/simplify the following expressions. (1 point each)

$$\log_9 \frac{1}{3}$$

$$\log 10000$$

$$2^{\log_2 3}$$

34. (2 points) Use the properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$$2 \log_3 x + \frac{1}{2} \log_3 (y + 1) - 3 \log_3 z$$

35. (2 points) Solve.

$$e^{2x-1} + 1 = 3$$

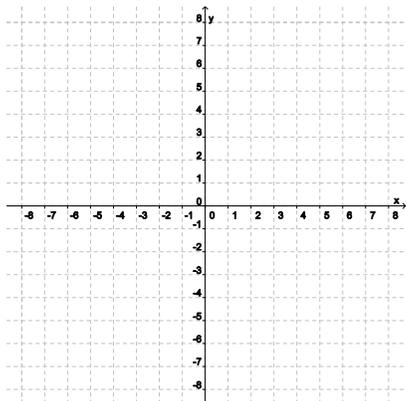
36. (2 points) Solve.

$$\log_9 x + \log_9 (x - 8) = 1$$

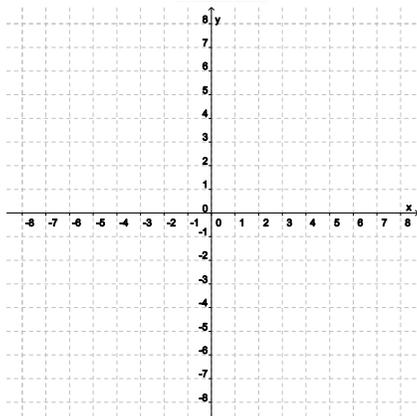
37. (3 points) Find the distance between the following two points. Then find the midpoint between the following two points. Simplify radicals if possible.

$(1, 3)$ and $(0, -2)$

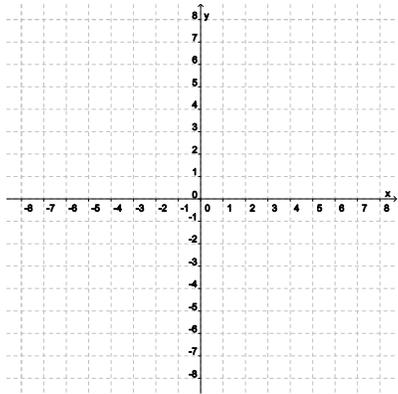
38. (3 points) Graph the following equation: $x^2 + y^2 + 10x + 4y + 20 = 0$



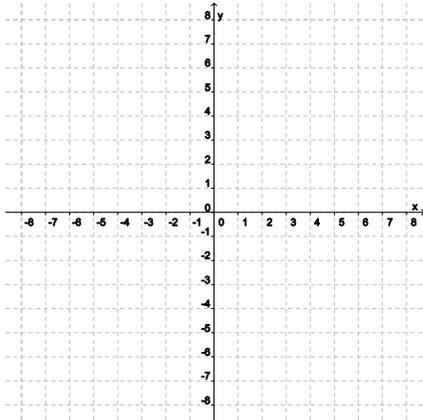
39. (3 points) Identify the following conic section and graph it: $x = (y - 1)^2 - 4$



40. (3 points) Identify the following conic section and graph it: $\frac{(x+4)^2}{4} + \frac{(y-3)^2}{25} = 1$



41. (3 points) Identify the following conic section and graph it: $16x^2 - 9y^2 = 144$



42. (3 points) The sum of two numbers is 20 and their product is 96. Find the numbers.

43. (2 points) Write the first four terms of the following sequence.

$$a_n = \frac{(-1)^{n+1}}{n^2}$$

44. (2 points) Find the sum:

$$\sum_{i=2}^4 (i+1)(i-2)$$

45. (2 points) Use the Binomial Theorem to expand $(x^2 - 2y)^4$

Sample Math 71B Final Exam #2

- 1) (3 points) Given that the formula $A = 100e^{0.02t}$ models the population of Mathtown, California (where t is number of years after 2005), in what year will the population reach 150?
- 2) (2 points) Working together, you and your friend can vacuum a house in 45 minutes. If you can vacuum twice as fast as your friend, how long would it take your friend to vacuum the house?
- 3) (3 points) Suppose you wanted to mix a 10% acid solution with a 60% acid solution to make 50 ounces of a 30% acid solution. How many ounces of the 10% solution and how many ounces of the 60% solution should be mixed?
- 4) (1 point) Evaluate to four decimal places: $\log_4 29$

5) (3 points) Solve and write your solution set using **interval notation**: $-2|3x - 5| \leq 2$

6) (3 points) Solve: $12x^3 - 10x^2 - 12x = 0$

7) (3 points) Solve: $\frac{2x-1}{x^2+2x-8} + \frac{2}{x+4} = \frac{1}{x-2}$

8) (4 points) Solve: $\sqrt{x-7} + \sqrt{x} = 7$

9) (4 points) Solve: $\log_3(x-5) + \log_3(x+3) = 2$

10) (3 points) Solve by using the quadratic formula: $2x^2 = 3x - 2$

11) (3 points) Solve: $x - 4\sqrt{x} - 21 = 0$

12) (2 points) Solve the formula for t : $\frac{ct}{1+t} = p$

13) (1 point) Find the domain of $f(x) = \frac{(x-2)^2}{x^2-13x+36}$ and write the answer using **set-builder notation**.

14) (1 point) Find the domain of $f(x) = -\sqrt{2x-5}$ and write the answer using **set-builder notation**.

15) (2 points) Suppose $f(x) = x^2 + 1$ and $g(x) = \frac{x+2}{3}$. Find $(f \circ g)(x)$ and simplify it.

16) (4 points) **Solve** and **graph** the solution set on a real number line: $\frac{3x}{x-3} \geq 1$

17) (2 points) Solve and write the solution set in **interval notation**: $6 - 5x > 1 - 3x$ and $4x - 3 \geq x - 9$

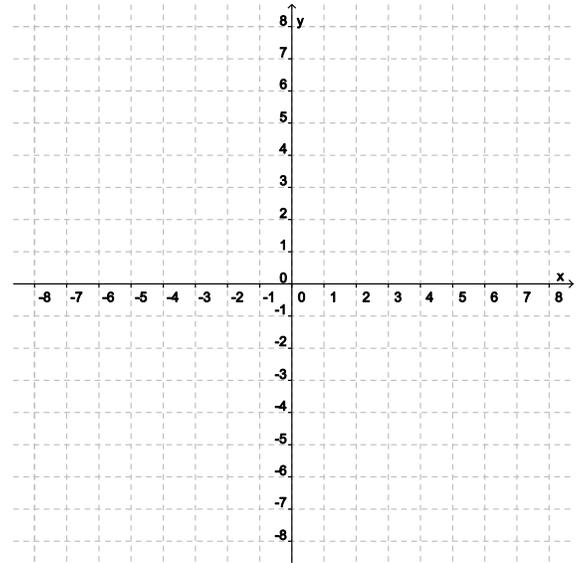
18) (3 points) Solve the system:

$$x + y^2 = 4$$

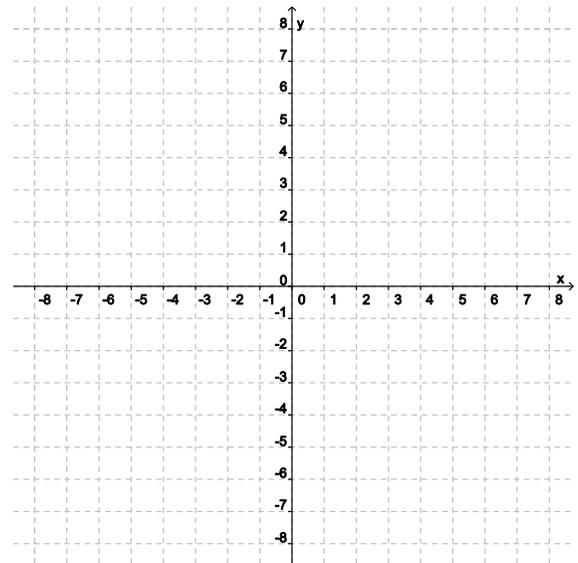
$$x^2 + y^2 = 16$$

19) (4 points) Find the **vertex**, **x-intercepts**, and **y-intercept** of the following quadratic function. Then **graph** it.

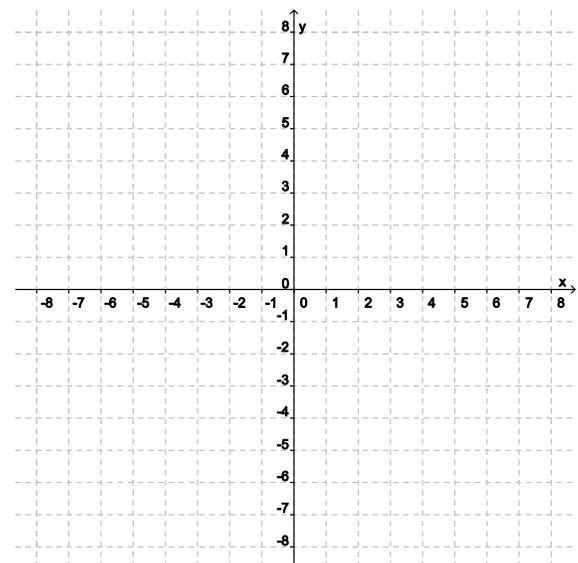
$$f(x) = (x - 2)^2 - 4$$



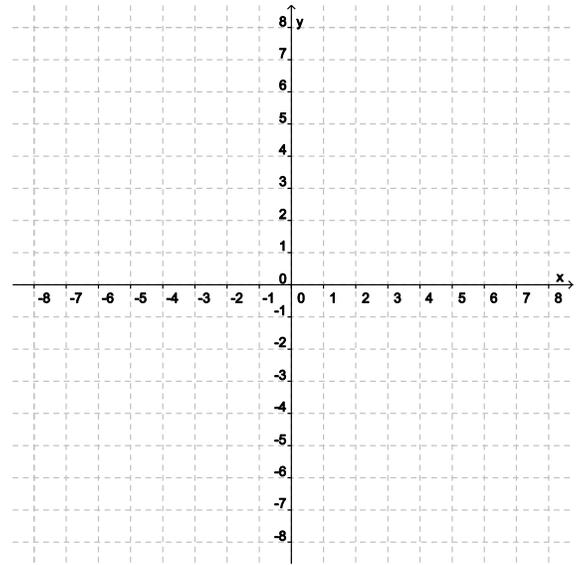
20) (3 points) **Identify** and **graph**: $x = y^2 - 2y - 3$



21) (3 points) **Identify** and **graph**: $\frac{x^2}{9} = 1 + \frac{y^2}{25}$



22) (3 points) **Identify and graph:** $x^2 + y^2 + 4x - 4y - 1 = 0$

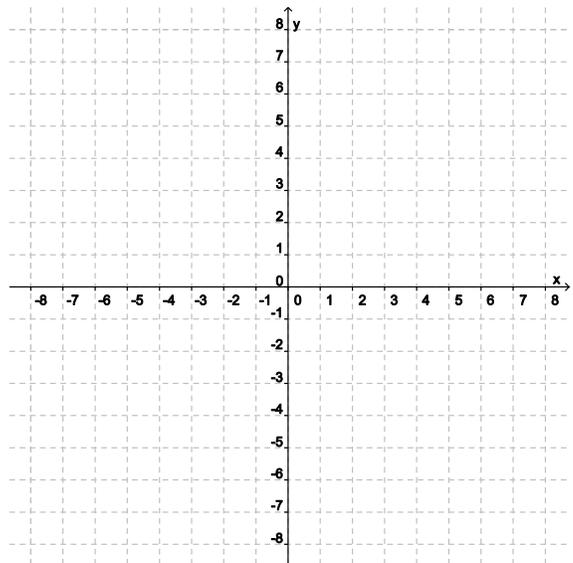


23) Here's a linear inequality: $1 - \frac{4x+7}{6} < \frac{1-x}{3}$

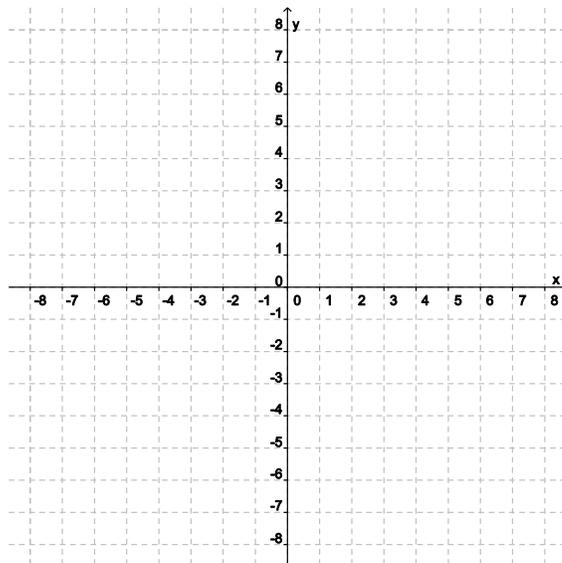
a. (2 points) Solve the linear inequality. Write your answer in **interval notation**.

b. (1 point) Graph the solution set on a number line.

24) (2 points) Graph $f(x) = \left(\frac{1}{3}\right)^x + 2$



25) (2 points) Graph $f(x) = \log_2(x - 3)$

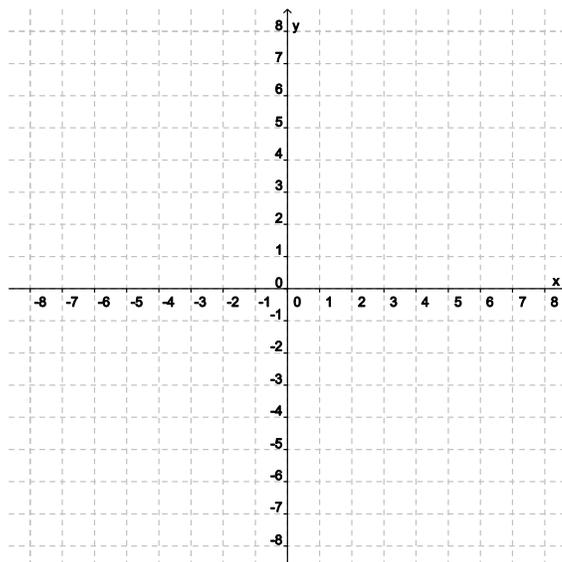


26) (3 points) Graph the following system of linear inequalities.

$$3x + y \leq 6$$

$$x \geq -2$$

$$y \leq 4$$



27) (3 points) Divide: $(3x^4 - 2x^2 + x - 5) \div (x^2 - 2)$

28) (2 points) Factor completely, or state that the polynomial is prime: $-5x^5 - 40x^2$

29) (2 points) Factor completely, or state that the polynomial is prime: $8x^3y^4z - 6x^2y^5z^3 + 2xy^3z^2$

30) (2 points) Factor completely, or state that the polynomial is prime: $2ax + 6ay - bx - 3by$

31) (3 points) Subtract and simplify: $\frac{7}{3y^2+y-4} - \frac{9y+2}{3y^2-2y-8}$

32) (3 points) Simplify:

$$\frac{\frac{2y}{y^2 + 4y + 3}}{\frac{1}{y+3} + \frac{2}{y+1}}$$

33) (3 points) Simplify: $\left(-125x^{\frac{1}{2}}y^{-3}\right)^{\frac{1}{3}}$

34) (2 points) Simplify: $\sqrt[4]{\sqrt[5]{x}}$

35) (2 points) Simplify: $-3x^3\sqrt{2x^4y^2} \cdot 2^3\sqrt{4xy}$

36) (2 points) Simplify: $6\sqrt{45x} - 3\sqrt{20x}$

37) (2 points) Divide and simplify to the form $a + bi$: $\frac{4+5i}{2-3i}$

38) (2 points) Simplify: i^{87}

39) (2 points) Rationalize the denominator: $\frac{\sqrt{3}-5\sqrt{2}}{3\sqrt{2}-\sqrt{3}}$

40) (3 points) Use the properties of logarithms to expand the logarithmic expression as much as possible.

$$\log_b \left(\frac{\sqrt{x}y^3}{z^3} \right)$$

41) (2 points) Find an equation for the inverse of $f(x) = (x + 1)^3$.

42) (3 points) Find the first three terms of the sequence $a_n = (-1)^{n+1} \cdot n!$

43) (2 points) Find the sum:

$$\sum_{i=2}^4 (i + 1)(i - 2)$$

44) (3 points) Expand using the binomial theorem: $(2x - y)^4$

45) (3 points) Find the **vertex** of $f(x) = x^2 + 6x - 3$. What is the **range** of f ?

46) (1 point) What is the degree of the following polynomial?

$$3x^2y^4 + 3xy^3 - 4x^5 + 2y - 1$$

47) (1 point) True or false: $\sqrt{-4} = -2$

48) (1 point) True or false: $\sqrt{-5} \cdot \sqrt{-7} = \sqrt{35}$

49) (1 point) True or false: $\sqrt[5]{(-4)^5} = |-4|$

50) Evaluate the following (1 point each)

$$e^{\ln 67} =$$

$$\log 250 + \log 4 =$$

$$\ln 1 =$$

$$\log_3 135 - \log_3 5 =$$