

Name: _____

Date: _____

Math 154 Final
Sections 8.3 through 14.5

1. (4 points) Solve the rational inequality. Then graph the solution set and put the solution in interval notation.

$$\frac{x-5}{x-3} \leq 0$$

2. (15 points) $f(x) = 2x - 3$ $g(x) = x^2 + 4$

a) Determine $(f + g)(3)$

b) Determine $(f - g)(x)$

c) Determine $(fg)(x)$

d) Determine $\left(\frac{g}{f}\right)(5)$

e) Determine $(f \circ g)(x)$

3. (4 points) Graph the function and label key points.

$$g(x) = -\frac{2}{3}x + 4$$

4. (8 points) Graph the function by writing the equation in standard form and label key points.

$$y = x^2 + 4x + 3$$

5. (8 points) Graph the function by writing the equation in standard form and label key points.

$$x^2 + y^2 - 8x + 4y - 5 = 0$$

6. (8 points) Graph the function by writing the equation in standard form and label key points.

$$4x^2 + 9(y-1)^2 = 36$$

7. (5 points) Determine if the function is one-to-one. If it is, then find f^{-1} and graph f and f^{-1} on the same axis.

$$f(x) = x^2 - 2 \quad (x \geq 0)$$

8. (5 points) Express as a single log with no coefficient and no fractional exponents.

$$\frac{1}{4} \log_a x + \frac{2}{3} \log_a y$$

9. (24 points) Find the unknown in each equation.

a) $\log_8 x = 2$

b) $\log_x 16 = 4$

c) $y = \log_{\frac{1}{3}} 27$

d) $3^{x-2} = 4$

e) $\log_3 8 = x$

f) $23 = 3\ln(x-1) + 14$

g) $\log_2(x-2) + \log_2(x+2) = 9$

h) $\log_3(10x) - \log_3(x-3) = 2$

10. (5 points) Simplify the expression. (Write it with multiple logs.)

$$\log_2 \sqrt[3]{\frac{8x^5}{y^3}}$$

11. (8 points) Solve the system.

$$x + y = 7$$

$$y - z = -1$$

$$x + 3z = 18$$

12. (6 points) Solve the system.

$$y = x^2$$

$$y - 2x = 3$$

13. (6 points) Sketch the system of inequalities.

$$4x^2 + y^2 < 16$$
$$x - y < -2$$

14. (10 points) Find the n th term, then find the sum of the first 11 terms.

a) 4, 1, -2, -5, ...

b) 3, 6, 12, 24, ...

15. (3 points) List the first three terms of the sequence whose n th term is

$$a_n = \frac{(-1)^n}{3^{n+1}}$$

16. (4 points) Find the sum of the infinite series.

$$\sum_{n=1}^{\infty} \left(-\frac{1}{8}\right)^n$$

17. (4 points) Use the binomial theorem or Pascal's Triangle to expand the binomial.

$$(x+3)^5$$

18. (3 points) Use the definition of a binomial coefficient to find:

$$\binom{7}{3}$$

19. (4 points) Find the fourth term in the polynomial.

$$(m-2p)^6$$

Bonus: (2 points possible) Solve for x. $x - 4x^{\frac{1}{2}} - 21 = 0$