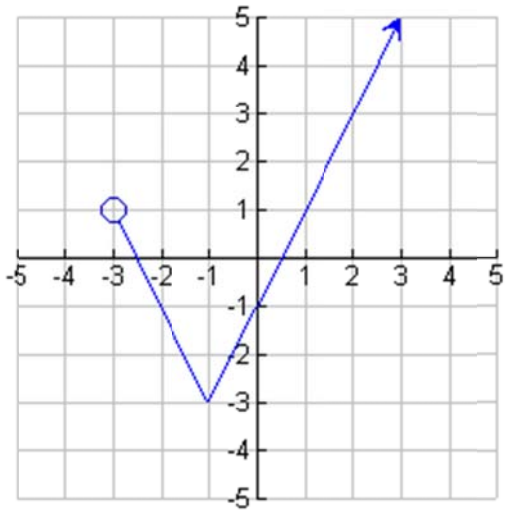
Math 104 Final Exam Review

1. Use the graph of $f(x)$ to answer the questions below.



   a. Evaluate $f(1)$.
   b. Determine all values of x that produce $f(x) = -1$.
   c. State the domain of the function using interval notation.

2. Write in slope-intercept form the equation of the line passing through (6, -1) to perpendicular to $4x - 3y = -21$.

3. Solve the absolute value inequality $\left|-\frac{x}{2}+3\right| < 2$. Write your answer using interval notation.

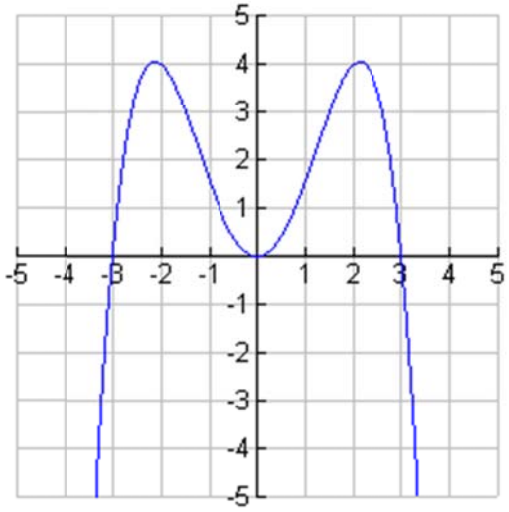
4. Two trains depart simultaneously from a station, traveling in opposite directions. One averages 8 km/hr more that the other, after ½ an hour they are 100 km apart. Determine the speed of each train. (Use the addition method to solve the system of equations.)

5. Simplify the following expression. Write your answer in terms of positive exponents. Assume that the variable x represents a positive real number.

$$\frac{\left(3x^{\frac{3}{2}}x^{\frac{1}{2}}\right)^4}{9x^5}$$

6. A concrete walk of uniform width is to be built around a circular pool. The diameter of the pool is 24 meters and enough concrete is available to cover 52π square meters. If all of the concrete is to be used, how wide should the walk be?

7. Use the graph of the polynomial function, $y = P(x)$ to answer the questions that follow.



   a. List the x-intercepts of the graph of $y = P(x)$.
   b. Find two of the three linear factors of the polynomial.
   c. Solve $P(x) \geq 0$. Give your answer in interval notation.

8. Solve the equation $10y^3 = 29y^2 - 10y$ by factoring.

9. Solve by completing the square.

$$2x^2 + 12x - 32 = 0$$

10. The height of a cannonball is given by $h(t) = -9.8t^2 + 16t + 15.2$, where $h(t)$ represents the height of the cannonball in meters and t is the number of seconds that have elapsed since the cannonball was fired. Determine how many seconds into the flight the maximum height is reached and the highest point that the cannonball reaches.

11. Perform the indicated operation and express the result in standard $a + bi$ form.

$$\frac{85}{7 - 6i}$$

12. Perform the indicated division by rationalizing the denominator and then simplifying.

$$\frac{10}{1 + \sqrt{7}}$$

13. The side of one square is 5 cm longer than the side of another square. Their total area is 193 cm^2. Determine the length of a side of each square.

14. A bakery has 10 pounds of premium coffee that costs $7.50 per pound. A baker wants to mix this with ordinary coffee which costs $3.50 per pound to make a mixture which costs $6.00 per pound. How much ordinary coffee must be used? What will the weight of the final mixture be?

15. Simplify the following expression. Write the result in lowest terms. Assume that the variable *w* is restricted to values that prevent division by 0.

$$\frac{3w^{-2}+23w^{-1}-8}{24-29w^{-1}-4w^{-2}}$$

16. Simplify the following expression and write the result in standard *a* +*bi* form.

$$\frac{2\sqrt{-9}-\sqrt{36}}{6}$$

17. Solve the equation.

$$\frac{12}{w+5}+\frac{2w+15}{w^2+11w+30}=\frac{w+3}{w+6}$$

18. Solve the equation below for *b*.

$$2A=\frac{hb+B}{1+b}$$

19. Simplify the expression. Write the results in lowest terms. Assume $x \neq 0$.

$$\frac{13}{6x}-\frac{x^2}{3}\div\frac{2x^3}{5}$$

Math 104 Final Review Answers

1. (a) $f(1) = 1$
   (b) x = -1, x = 0
   (c) Domain: (-3, ∞)
2. $y = -\frac{3}{4}x + \frac{7}{2}$
3. (2, 10)
4. $r_1 = 96$ km/hr; $r_2 = 104$ km/hr
5. $9x^3$
6. 2m
7. (a) (-3, 0), (3,0), (0,0)
   (b) (x – 3), (x+3), x
   (c) [-3, 3]
8. $y = 0, y = \frac{2}{5}, y = \frac{5}{2}$
9. x = 2, x = -8
10. t_{max}= 1second; h_{max} = 25 meters
11. $7 + 6i$
12. $-\frac{5\left(1-\sqrt{7}\right)}{3}$
13. 7 cm, 12 cm
14. 6 lbs of the $3.50, 16 lbs of the final mixture
15. $\frac{-w+3}{3w-4}$
16. $-1 + i$
17. W = 12
18. $b = \frac{B-2A}{2A-h}$
19. $\frac{4}{3x}$