

## Math 114 Post-Test

1. Find the domain of the indicated function. Express the answer using set builder notation or interval notation.

$$M(x) = \frac{\sqrt{4-x}}{x+1}$$

2. For the given function  $f$  find and simplify  $\frac{f(x+h) - f(x)}{h}$ .

$$f(x) = 3x - 4$$

3. Sketch the graph of  $y = f(x)$ .

$$f(x) = \begin{cases} -x-1 & \text{if } x \leq 2 \\ -x+5 & \text{if } x > 2 \end{cases}$$

4. A plant can manufacture 80 golf clubs per day for a total daily cost of \$8,147 and 100 golf clubs per day for a total daily cost of \$9,647.

- a) Assuming that the daily cost function is linear, find the total daily cost of producing  $x$  golf clubs.  
b) What is the slope of the graph of the equation found in part a? Interpret verbally. (4 pts)

5. Solve.  $\frac{2x}{x-3} = 7 + \frac{6}{x-3}$

6. Complete the square and find the vertex form of the quadratic function, then write the vertex and the axis.  $n(x) = 3x^2 + 6x - 2$

7. Find all zeros exactly (rational, irrational, and imaginary) for the polynomial equation.

$$x^4 - 2x^2 - 16x - 15 = 0$$

8. Solve the rational inequality.  $\frac{x^2 + 4x - 20}{3x} \geq 4$

9. Solve algebraically. Round to three decimal places if needed.

$$3^x = 20$$

10. Solve algebraically. Round to three decimal places if needed.

$$\log(x+3) + \log x = 1$$

11. How many years, to the nearest year, will it take a sum of money to double if it is invested at 15% compounded annually?

12. Suppose you have \$12,000 to invest. If part is invested at 10% and the rest at 15%, how much should be invested at each rate to yield 12% on the total amount invested.

**13. Graph the solution region for the following system of linear inequalities.**

$$x + 2y \leq 8$$

$$3x - 2y > 0$$

$$x \geq 0$$

**14. Write the system as a matrix equation and solve using inverses. You may use a calculator but label  $A$ ,  $A^{-1}$ ,  $B$ , and  $X$ . Also make sure you write what you used to find the answer.**

$$11x_1 + 4x_2 = -1$$

$$3x_1 + x_2 = 9$$

**15. Solve the system using Cramer's Rule. Make sure to clearly label all parts including what you used to find your answer.**

$$x + 2y = 3$$

$$x + 3y = 5$$

**16. Sketch a graph of the equation and find the coordinates of the foci**

$$16y^2 - 9x^2 = 144$$

**17. Determine whether the equation given is a parabola, circle, ellipse, or hyperbola.**

a)  $3x^2 + 3y^2 = 12$

b)  $4x^2 - 3y = 24$

c)  $2x^2 + y^2 = 4$

d)  $4x - 7y^2 = 28$

e)  $3x^2 - 5y^2 = 15$

**18. Solve the system.**

$$x^2 + 3xy + y^2 = 20$$

$$xy - y^2 = 0$$

**19. Let  $a_1, a_2, a_3, \dots, a_n, \dots$  be an arithmetic sequence. If  $a_1 = 3, a_{20} = 117$ , find  $d$  and  $a_{101}$ .**

**20. Expand the binomial using the binomial formula.**

$$(3p - 2q)^4$$