Name _____

MATH 124
FINAL EXAM v1

DIRECTIONS: Show work whenever possible even if it's multiple choice! Partial credit may be given for partially correct answers. Points may be deducted for missing or incomplete work. **You will receive a zero on the ENTIRE EXAM if you use apps or software to do the work on ANY problem.** Good luck!

1. An Olympic sized swimming pool is twice as long as it is wide. The area is 1250 square meters. What is the length and width?

---

2. Find the real solutions by factoring: $2x^3 - 14x^2 + 3x - 21 = 0$.

---

3. Bicyclist #1 can ride 12.5 miles in 30 minutes. Bicyclist #2 can ride the same distance in 45 minutes. College is 10 miles from the dorm where they reside. How much of a head start (in minutes) should Bicyclist #1 give Bicyclist #2 so that they reach the college at the same time?

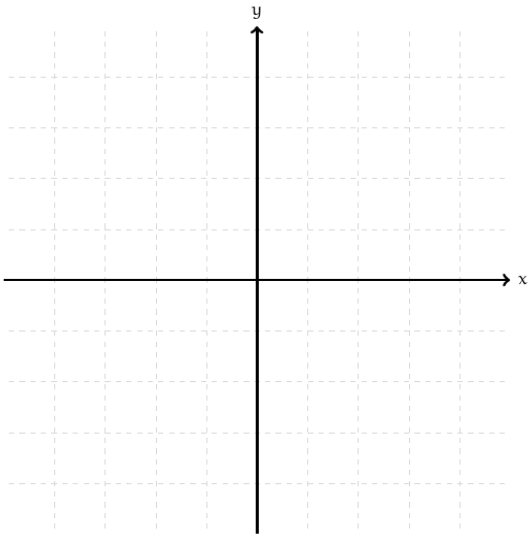
4. Solve the inequality algebraically. Express your answer using interval notation. Graph the solution set on a number line.

$| x + 3 | - 7 > 5$

---

5. For the given equation, list the intercepts. (Use ordered pairs) Show how you calculated them. Use graphing technology to sketch the graph and label the intercepts on the graph.

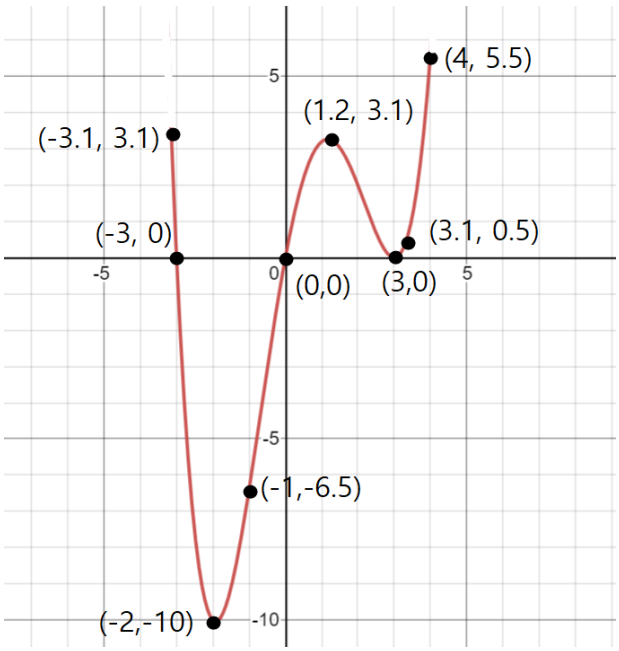
$x^2 + y - 6 = 10$



---

6. Line 1 goes through points (-2,3) and (0,7). Line 2 goes through points (-1, 5) and (1,4). Use slopes to determine whether the two lines are parallel, perpendicular, or neither.

7. Use the following graph of a function f to answer the questions.



A. What is f(1.2)?

B. For what value(s) of x is f(x) = 3.1?

C. What is the domain?

D. What is the range?

E. On which interval(s) is f(x) ≤ 0?

F. How often does the line y = -5 intersect the graph?

---

8. Use the graph in #7 to identify the following. Use ordered pairs.

A. Local maximum(s)

B. Absolute maximum

C. Local minimum(s)

D. Absolute minimum

---

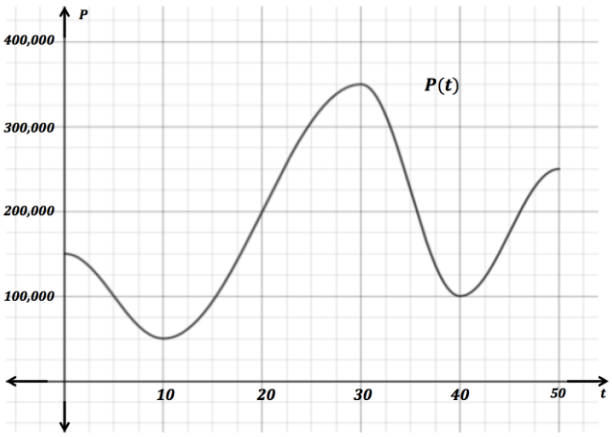
9. Suppose the population of a Nevadan city is given by the function $P(t)$, given below, where P is the number of people in the city and t is measured in years after 1980. On which interval(s) was the population of the city increasing?

(A) $(0, 10) \cup (30, 40)$

(B) $(50000, 350000)$

(C) $(10, 30) \cup (40, 50)$

(D) $(100000, 250000)$



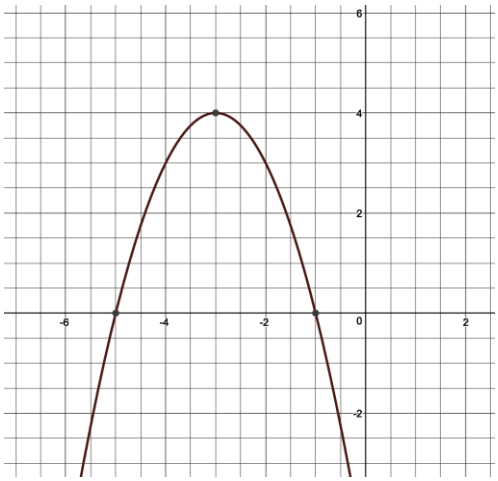
10. Which function could be illustrated in the graph.

(A) $f(x) = (x+3)^2 + 4$

(B) $f(x) = -(x+3)^2 + 4$

(C) $f(x) = (x-3)^2 + 4$

(D) $f(x) = -(x-4)^2 + 3$



---

11. Answer the following questions about polynomial function $f(x) = (x-2)^2(4-x)$.

A. What is the x-intercept(s)?

B. What is the y-intercept?

C. What are the zeros and their multiplicity? Does the graph touch or cross at each zero?

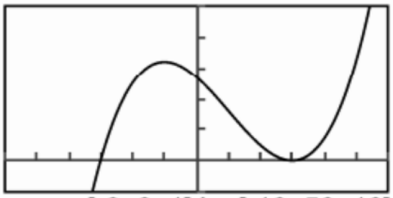
Zero	Multiplicity	Touches or Crosses

D. What is the degree of the polynomial function?

E. How many turning points does the graph have?

12.

The graph to the right is a complete graph, that is, it is continuous and displays the function's end behavior. All zeros are integers. Answer the following questions.



(a) List the zeros whose multiplicity is even. Select the correct choice below and fill in any answer boxes within your choice.

- **A.** _____ (Type an integers or a simplified fractions. Use a comma to separate answers as needed.)
- **B.** There are no such zeros.

List the zeros whose multiplicity is odd. Select the correct choice below and fill in any answer boxes within your choice.

- **A.** _____ (Type an integers or a simplified fractions. Use a comma to separate answers as needed.)
- **B.** There are no such zeros.

(b) Write an equation, expressed as the product of factors, of a polynomial function that might represent the graph shown. Use a leading coefficient of 1 or -1, and make the degree of f as small as possible.

f(x) = _____

(c) Use the equation in part (b) to find the y-intercept.

---

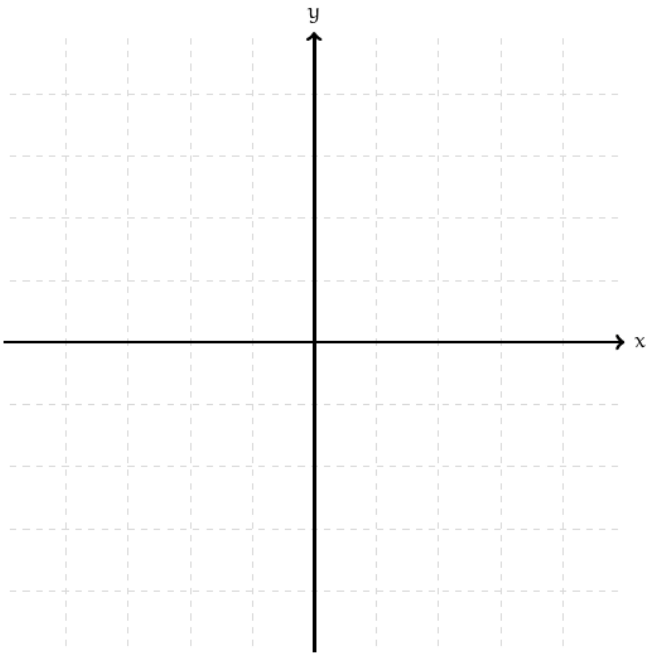
13. Find the inverse function of $f(x) = \frac{x+2}{x-3}$.

14. Solve the equation.

$5^{2x-1} = 625$

---

15. Graph $y = 3^x$ and its inverse on the same axes. Also graph the line $y = x$.



---

16. Solve the equation: $\log_3(x - 5) = 4$

17. Write the expression as a sum and/or difference of logarithms. Express powers as factors.

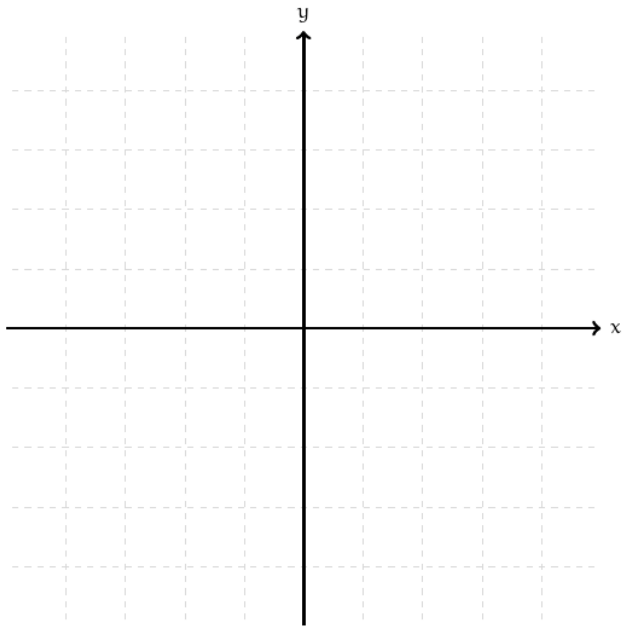
$$ln\frac{xy^3}{\sqrt{x^2-y}}$$

18. Solve. Check for extraneous solutions.

$3\log_2 x = -\log_2 27$

19. Use a graphing utility to solve the equation, rounded to 2 decimal places. Draw a sketch of the graph and indicate the solution(s) on the graph.

$\ln x + 1 = x^2 - e^x$



20.

. Solve the system of equations. $\begin{cases} x+y+z=9 \\ 2x+2y-z=6 \\ 3x-y+z=7 \end{cases}$

21. Find, if it exists, the product of the two matrices.

$$A = \begin{bmatrix} 5 & -1 \\ 2 & 3 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 3 \\ -2 & 3 \end{bmatrix}$$

EXTRA CREDIT

Find the 101st term of the arithmetic sequence 4, 7, 10, 13, …