



Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

## NON-CALCULATOR SECTION

Vocabulary: Define each word and give an example.

1. Polynomial Function
2. Fundamental Theorem of Algebra
3. Multiplicity

Short Answer:

4. Describe how to determine the end behavior of a polynomial function.
5. What does the Rational Roots Theorem state?

Review:

6. Find the discriminant of  $3x^2 - 2x + 5 = 0$  and state the number and nature of its zeros.
7. Simplify  $(3 - 2i)(-2 + 5i)$ .
8. Use the quadratic formula to solve  $x^2 + 5x - 3 = 0$



Problems:

**\*\*Be sure to show all work used to obtain your answer. Circle or box in the final answer.\*\***

9. Divide using either polynomial long division or synthetic division as appropriate.

a.  $(3x^4 - 5x^3 + x^2 + 7x) \div (3x + 1)$

b.  $(4x^4 + 2x^2 - 4x + 12) \div (x + 2)$

10. Given  $f(x) = x^3 + 6x^2 + 3x - 10$  and  $(x + 5)$  is a factor of  $f(x)$ , find all other zeros.

11. List the possible rational zeros of  $g(x) = 3x^4 - 5x^3 + 2x^2 - 8$

12. List all the x-intercepts of  $f(x) = (x + 8)^5(x - 1)^2(x - 4)^3$

13. Given  $f(x) = 2x + 7x^2 - 3 + 2x^3$ , answer the following questions:

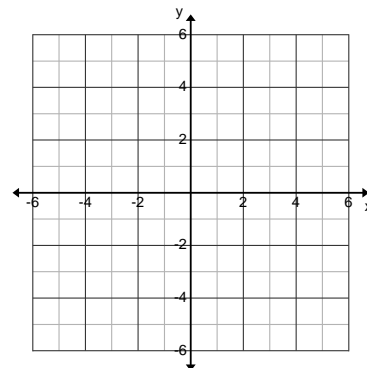
a. Write the function in standard form, state the leading coefficient and the degree

b. Evaluate  $f(x)$  using direct substitution given  $x = -4$ .

c. Evaluate  $f(x)$  using synthetic substitution given  $x = 2$ .

d. Find all zeros of  $f(x)$ .

e. Graph  $f(x)$ .





14. Is it possible to find a polynomial of degree 4 with real number coefficients that has -2 as its only real zero? Answer yes or no and explain.

15. Describe the end behavior of the polynomial function

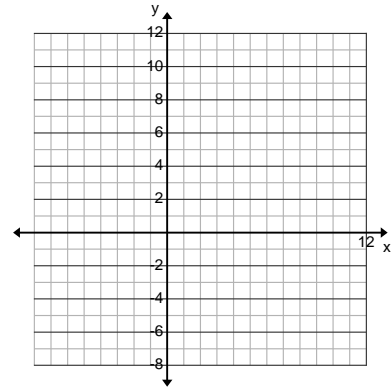
$$f(x) \rightarrow \text{_____ as } x \rightarrow -\infty$$

$$f(x) = -3x^5 - 4x^4 - 7x^3 + 3x^2 + 8x - 5.$$

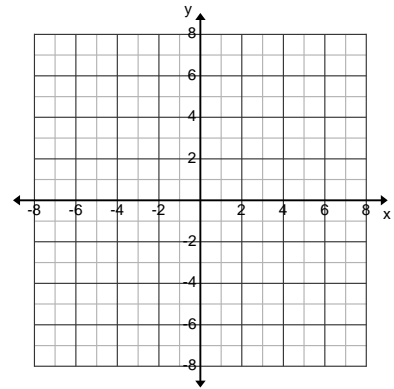
$$f(x) \rightarrow \text{_____ as } x \rightarrow \infty$$

16. Graph the polynomial function using transformations.

$$f(x) = 0.2(x - 3)^4 - 4$$

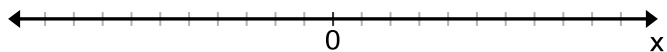


17. Graph the polynomial function  $f(x) = -(x - 2)^2(x - 5)^2$



18. Solve and graph the solution of the polynomial inequality.

$$x^4 + 4x^3 - 12x^2 \leq 0$$





## MULTIPLE CHOICE QUESTIONS

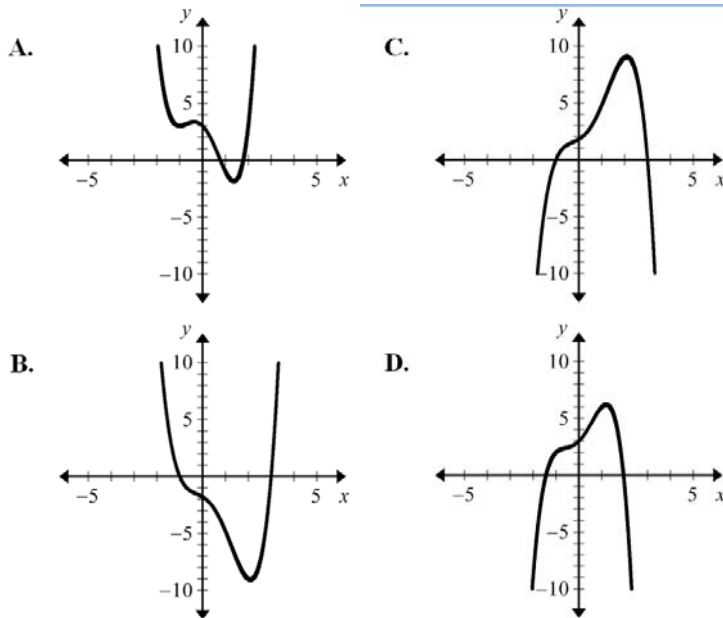
19. Which of the following represents the solution set of the polynomial equation  $f(x) = 4x^3 - 8x^2 - x + 2$ ?

- A.  $\left\{-\frac{1}{2}, \frac{1}{2}, 2\right\}$   
 B.  $\left\{-1, \frac{1}{2}, 2\right\}$   
 C.  $\{0, 1, 2\}$   
 D.  $\left\{-2, \frac{1}{2}, 2\right\}$

20. According to the Fundamental Theorem of Algebra, how many complex zeros does the polynomial  $f(x) = -4x^4 + 5x^2 + 7x - 2$  have?

- A. 2                      B. 3                      C. 4                      D. 5

21. Which best represents the graph of the polynomial function  $y = -x^4 + 2x^2 + 2x + 3$ ?



22. Use the remainder theorem to find the remainder when  $f(x)$  is divided by  $x - c$ ?

$$f(x) = x^4 + 8x^3 + 12x^2; x + 1$$

- A. 21                      B. -21  
 C. 5                      D. -5

