Name:_____Period:____Date:_____

Vocabulary: Define each word and give an example.

1. Linear Factorization Theorem

2. slant asymptote

3. power function

Short Answer:

4. Describe the graph of a function that has a repeated zero with odd multiplicity.

5. Describe how to find an end behavior asymptote. When is this asymptote a horizontal asymptote?

Review:

6. Factor $5xy-3y+10x-6$.

7. Show algebraically whether the function is odd, even, or neither.
   $h(x)=-2x^4-x^2+3$

8. Let $f(x)=\frac{1}{x-2}$ and $g(x)=x+5$. Find $(f\circ g)(x)$.

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

9. Write an equation for the linear function $f(x)$ if $f\left(\frac{7}{2}\right)=\frac{1}{2}$ and $f(4)=-2$.

10. Write an equation for the quadratic function whose graph contains the vertex $(3,-2)$ and point $(1,4)$.

11. Write the statement as a power function equation. Let *k* be the constant of variation. The force *F* needed varies directly with the distance *x* units from its resting position.

12. Use long division to divide $x^4+3x^3+x^2-3x+3$ by $x-3$.

    Use synthetic division to check your answer.

13. Find a degree 3 polynomial with real coefficients whose leading coefficient is -2 that has $-6,\ 2,$ and 4 as zeros. Write the polynomial in standard form.

14. Solve the equation: $x^2 - 6x + 13 = 0$.

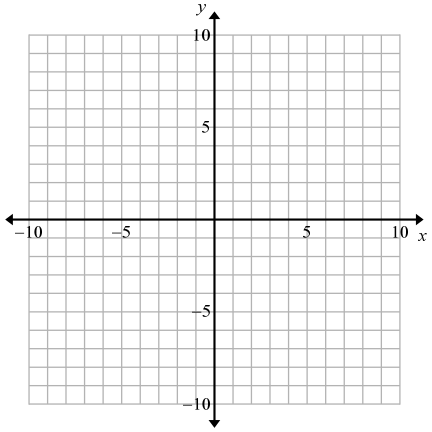
15. Perform the indicated operation:

a. $\dfrac{2+3i}{1-5i}$ b. i^{129} c. $\left|4-6i\right|$

16. Write a polynomial function with real coefficients in standard form whose zeros include $-2,\ 3,$ and $4-5i$.

17. Find all zeros of $f(x) = x^3 + 9x^2 + 33x + 65$ and write a linear factorization of $f(x)$.

18. Identify all asymptotes and intercepts of the function $g(x) = \dfrac{x^2 - 2x + 1}{x^2 - 9}$. Then sketch a graph of $g(x)$.



Domain: _____

Range: _____

y-intercept(s): _____

x-intercept(s): _____

Asymptotes(s): _____

End Behaviors in Limit Notation: _____

_____

19. Solve the equation: $\frac{x}{x+2}+\frac{5}{x-3}=\frac{25}{x^2-x-6}$

20. Solve the inequality: $\frac{(x-5)^3}{x(x+2)}\le 0$

21. Let $f(x)=(x-a)^3(x+b)^2(x-c)^2$ where *a*, *b*, and *c* are distinct real numbers. Which of the following statements is not true?

A. *f* has a root at $x=-b$.
B. $f(c)=f(a)$
C. The graph of *f* crosses the *x*-axis at $x=c$.
D. $x=c$ is a zero of multiplicity two.