

NAME: _____ Score _____ /100
Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

1 pt. each for 1 – 30. 5 pts. each for all others unless otherwise noted.

Circle T or F, whichever is correct.

1. T F Zeros of functions are not in the range of the function.
2. T F All zeros of functions are in the domain of the function.
3. T F If the point (3, 5) is on the graph of a function f, then $f(3) = 5$.
4. T F If f is the absolute value function, then its domain is all real numbers.
5. T F If f is a 6th degree polynomial function, then its graph has at least one x-intercept.
6. T F If f and g are functions then fg is a function whose rule is $fg(x) = f(x)g(x)$.
7. T F The cubing function has no inverse.
8. T F If a real zero of a polynomial function has odd multiplicity, the graph crosses the x-axis at that point.

Fill in each of the blanks to make the statements true.

9. A rational function is the _____ of two _____ functions.
10. The graph of a polynomial function is a _____ curve with _____.
11. If f and g are inverses of each other then
 - a) _____ = $f(g(x)) =$ _____
 - b) _____ = $g(f(x)) =$ _____
12. A function whose rule is $f(x) = \begin{cases} 3x & \text{if } x < 4 \\ x^2 & \text{if } x \geq 4 \end{cases}$ is called a _____ defined function.
13. By convention if the domain is not explicitly stated, it is the largest _____ of the real numbers for which the _____ makes _____.
14. The _____ of a function f is the set of all points of the form (a, f(a)) where a is an element of the domain and f(a) is the corresponding range element.
15. If f and g are functions such that $f(2) = 5$, $f(7) = 6$, $f(3) = 1$, $g(2) = 7$, $g(5) = 3$, $g(6) = 4$, then $f \circ g(5) =$ _____ (show your work on the line)
16. The function f whose rule is $f(x) = \frac{6x^4 - 5x^3 - 3x + 5}{2x^5 - 22x + 5}$ has a horizontal asymptote $y =$ _____
17. The degree of the function f whose rule is $f(x) = 3x^3 - 7x^5 + 2x + 7$ is _____

Circle all the words which can be used to correctly complete the sentence. Remember all polynomial functions are rational functions.

18. $f(x) = 7$ is the rule for a (constant linear quadratic identity polynomial rational) function.

19. $f(x) = x^2 + 2x + 1$ is the rule for a (constant linear quadratic identity polynomial rational) function.

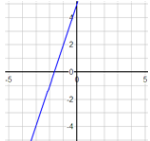
20. $f(x) = x^5 + 5x + 6$ is the rule for a (constant linear quadratic identity polynomial rational) function.

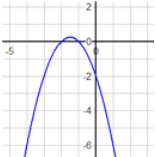
21. $f(x) = \frac{3x - 4}{x^2 + 2x + 1}$ is the rule for a (constant linear quadratic identity polynomial rational) function.

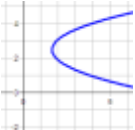
22. $f(x) = x + 4$ is the rule for a (constant linear quadratic identity polynomial rational) function.

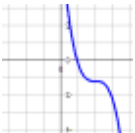
Match the following phrases with the graphs in problems 21 – 25 by writing the letter for the phrase in the blank.

- (a) not a function (b) a function which does not have an inverse
 (c) is a function which has an inverse

23.  This graph is the graph of _____.

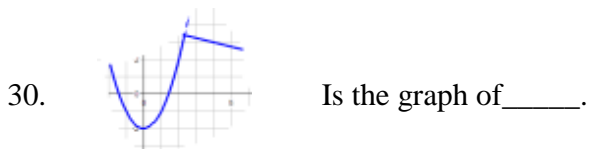
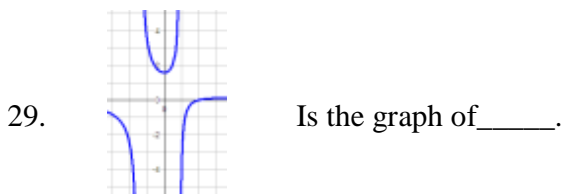
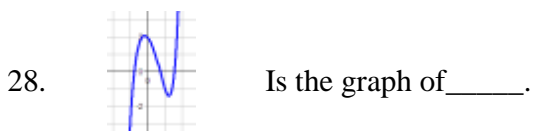
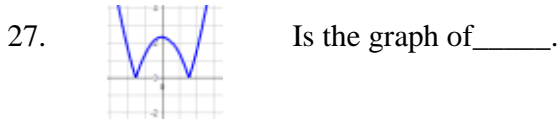
24.  This graph is the graph of _____.

25.  This graph is the graph of _____.

26.  This graph is the graph of _____.

Match the following phrases with the graphs in problems 21 – 25 by writing the letter for the phrase in the blank.

- (a) polynomial function (b) rational function
 (c) quadratic function (d) piecewise defined function
 (e) absolute value function (f) none of the above



31. What is the domain of the function whose rule is $f(x) = \frac{(x-3)(x+2)}{x(x-5)}$?

32. What are the zeros of the function whose rule is $f(x) = \frac{x(x-3)(x-2)}{(x+5)}$?

33. What are the vertical asymptotes of the function whose rule is $f(x) = \frac{(x+3)(x-2)}{(x-5)(x+3)}$?

Remember asymptotes are lines not numbers.

34. What is the horizontal asymptote (if there is one) of the function whose rule is $f(x) = \frac{2x^4 - 2x^3 + 10}{4x^4 - 5x^2 - 11x + 5}$

Remember asymptotes are lines not numbers.

35. What are the possible rational zeros of the function whose rule is $f(x) = 7x^3 + 2x^2 - 7x - 5$?

$$p \in \{$$

$$q \in \{$$

$$\frac{p}{q} \in \{$$

36. The rule for a function f is $f(x) = -2x^7 - 22x^4 + 6x^3 - 7x^2 + 8x - 15$.Complete the following statements about f.

- The graph of f “tries” to cross the x-axis _____ times.
- The graph of f can cross the x-axis no more than _____ times.
- The graph of f must cross the x-axis at least _____ times.

$$\text{As } x \longrightarrow +\infty, f(x) \longrightarrow \underline{\hspace{2cm}}$$

d.

$$\text{As } x \longrightarrow \infty, f(x) \longrightarrow \underline{\hspace{2cm}}$$

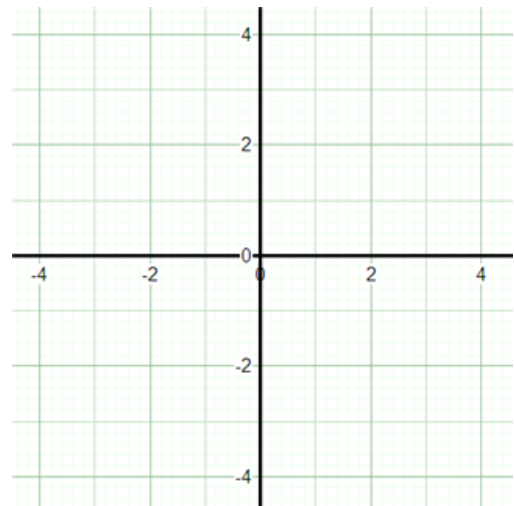
37. Find the zeros of the function whose rule is $f(x) = x^2 + x - 1$. Show your work. no work: no credit

38. Find the inverse of the function whose rule is $f(x) = 7x - 3$.

39. Find the rule for the linear function whose graph is the line through $(-4, 3)$ with slope 7. Show your work.
no work: no credit.

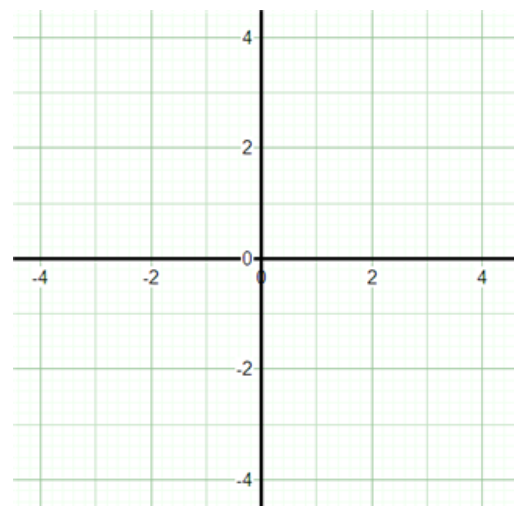
40. An analysis of a function f reveals the following facts. **Shade excluded regions and Sketch the graph of f .** Label important points.

- f is a rational function
- The real zero of f is -1
- The vertical asymptotes are $x = 0$ and $x = 4$
- The horizontal asymptote is $y = 0$
- $f(-2) < 0$, $f(-\frac{1}{2}) > 0$, $f(1) < 0$, and $f(5) > 0$



41. An analysis of a function f reveals the following facts. **Sketch the graph of f .** Label important points.

- f is a polynomial function of degree 5.
- As $x \longrightarrow -\infty$, $f(x) \longrightarrow +\infty$
- As $x \longrightarrow +\infty$, $f(x) \longrightarrow -\infty$
- The real zeros of f are -1 , 0 , and 3 .
- The multiplicity of -1 is 2.
- The multiplicity of 3 is 2



42. Divide $x^3 - 7x^2 - x + 87$ by $x^2 - 10x + 29$. Show your work. no work: no credit.

43.(6 pts) **Definition:** A _____ consists of three things;

- A set called the _____
- A set called the _____
- A _____ which associates _____ element of the
- _____ with a _____ element of the range.

44. (4 pts)

