

NAME: _____ Please print _____ Score _____/100

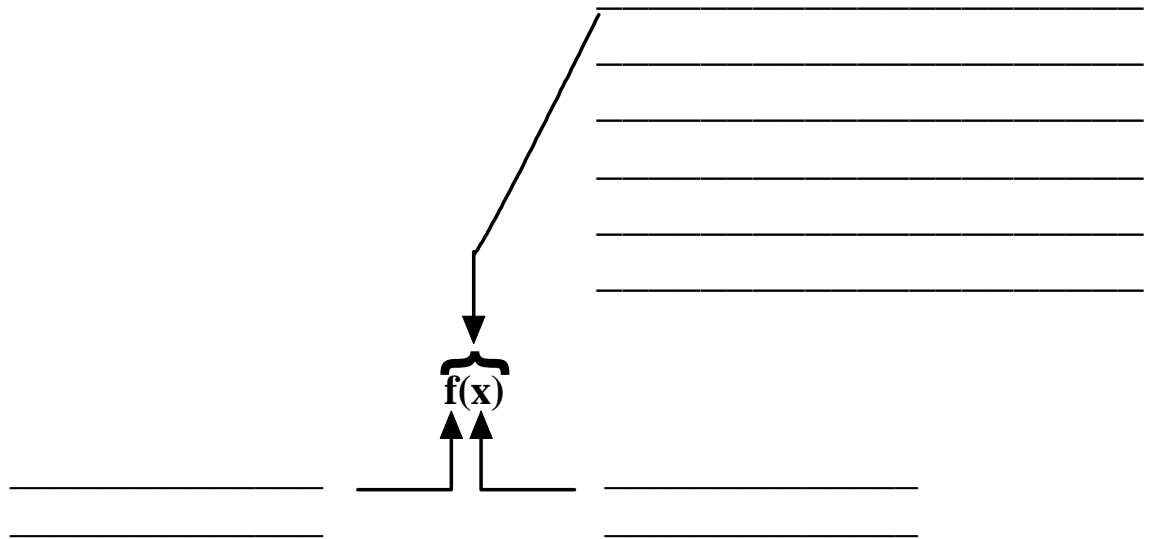
SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

Use = symbols when appropriate. Do not use = symbols when not appropriate.

Questions 1 – 10 are each worth 2 points.

- 1. T F The zeros of a function are domain elements.
- 2. T F The zeros of a function are range elements.
- 3. T F The function whose rule is $f(x) = |3x - 5|$ is a linear function .
- 4. T F The graph of a function f is above the x -axis if $f(x) > 0$ for all domain elements x .
- 5. T F The rule for every function may be written as an equation.
- 6. T F If f is a function and k is a domain element then the point $(k, f(k))$ is on the graph of f .
- 7. T F The product of two functions is a function.
- 8. T F The squaring function is a quadratic function.
- 9. T F Every function has an inverse.
- 10. T F The composition of two functions is a function

11. (5 pts)



12. (5 pts) Definition: A function consists of three things

- _____
- _____
- _____

(10 pts) Rules for functions are given at the top of the page and graphs of functions are given below them. Match the graphs and the rules by writing the letter which identifies a graph in the blank preceding a rule for a function.

13. _____ $f(x) = 4$

14. _____ $f(x) = -3x + 3$

15. _____ $f(x) = x^2$

16. _____ $f(x) = x^3$

17. _____ $f(x) = -x^2$

18. _____ $f(x) = (x + 2)^2$

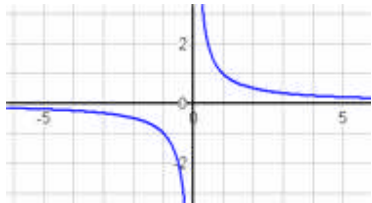
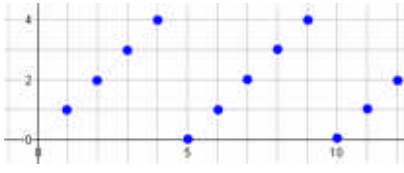
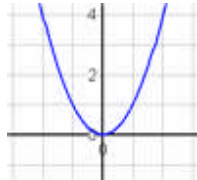
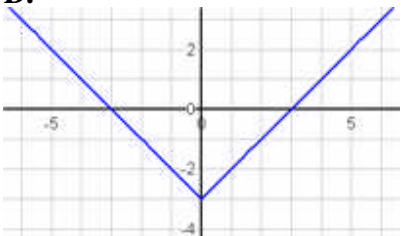

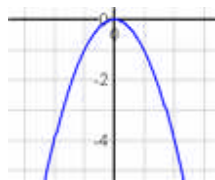

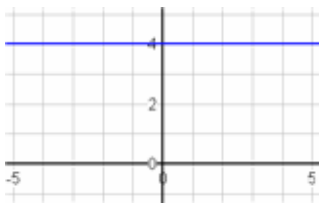
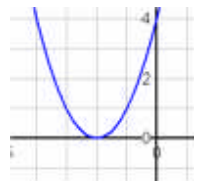


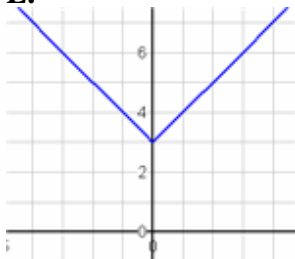
19. _____ $f(x) = |x| - 3$

20. _____ $f(x) = \frac{1}{x}$

21. _____ mod_5

22. G $\exp(x) = e^x$

The graphs are shown in blue.

<p>A.</p> 	<p>B.</p> 	<p>C.</p> 
<p>D.</p> 	<p>E.</p> 	<p>F.</p> 
<p>G.</p> 	<p>H.</p> 	<p>I.</p> 
<p>J.</p> 	<p>K.</p> 	<p>L.</p> 

Questions 23 – 39 are each worth 3 points.

23. A linear function is a function whose rule may be written in the form

24. A quadratic function is a function whose rule may be written in the form

25. Suppose f is a function whose rule is $f(x) = x^2 + 3x + 1$ and $k - m$ is in the domain of f . Compute the unique range element associated with the domain element $k - m$.

26. Find the rule for the linear function f for which $f(1) = 3$ and $f(0) = -4$.
Hint: Determine the slope and the y-intercept and then write the rule.

27. Suppose the rule for the function f is $f(x) = x^3 - 2x + 4$. Compute $f\left(\frac{1}{2}\right)$ **NO DECIMALS**

28. Find the zeros of the function whose rule is $f(x) = \frac{2}{3}x - \frac{4}{9}$. **NO DECIMALS**

29. The rules for two functions f and g are given by $f(x) = 2x - 5$ and $g(x) = x^2 - 2x - 15$. Find the rules for each of the following functions. Make sure you use functional notation and your rule is written as a rule

a) fg

b) $f \circ g$

c) $g \circ f$

d) f^{-1}

30. Fill in the blanks to find the zeros of the function whose rule is given by $f(x) = x^2 - 2x - 15$.

Solution: To find the _____ of f we must solve the _____ resulting from _____

Therefore in this case we must solve $0 = \underline{\hspace{2cm}} = (\underline{\hspace{1cm}})(\underline{\hspace{1cm}})$

The _____ assures us the solution set for the equation is $\{-3, 5\}$

Therefore the _____ of f are _____

31. Determine the domain of the function whose rule is $f(x) = \sqrt{-5x-6}$

Hint: Your work should lead to the conclusion that the domain of f is $\left(-\infty, -\frac{6}{5}\right]$

32. The domain of the function whose rule is $f(x) = \frac{x}{x-2} + \frac{1}{x-4}$ is all real numbers except 2 and 4.

Use interval notation to complete the following description of the domain of f.

The domain of f is _____

33. What is the rule for the linear function whose graph passes through (2, 7) with slope $\frac{3}{5}$

34. G is the sequence whose rule is given by: G(n) is the number of distinct primes used in the unique prime factorization of n. Compute G(60).

35. G is the sequence whose rule is given by: G(n) is the number of distinct primes used in the unique prime factorization of n. What is the domain of G ?

36. The composition of two functions f and g is a function $f \circ g$ whose rule is

37. Recall that $\text{mod}_6(n)$ is the remainder when n is divided by 6.

Recall that $\tau(n)$ the number of positive natural number divisors of n .

Compute $\tau \circ \text{mod}_6(17)$. Show your work.

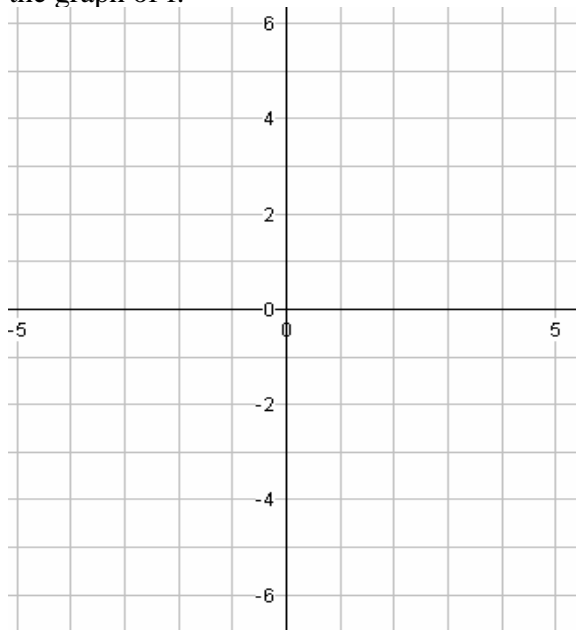
38. Suppose f is a function for which:

i) The domain of f is $(-2, \infty)$

ii) $f(x) > 0$ for all $x \in [0, \infty)$.

iii) $f(x) < 0$ for all $x \in (-2, 0)$

On the following coordinate system cross off (Shade) the regions which CANNOT contain any part of the graph of f .



39. Sketch the graph of the function whose rule is $f(x) = |(x-1)(x+2)|$

