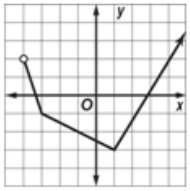
PreCalculus: Chapter 1 Review

1. State the domain and range of the function shown.



D: $(-4, \infty)$

R: $[-3, \infty)$

$(x+h)(x+h)$

2. Given $f(x) = 2x^2 - x$, find $f(x+h)$.

$f(x+h) = 2(x+h)^2 - (x+h)$

$= 2(x^2+2xh+h^2) - x - h$

$= 2x^2 + 4xh + 2h^2 - x - h$

3. Find the zero of $f(x) = 4x + \frac{2}{3}$.

$0 = 4x + \frac{2}{3} \rightarrow -\frac{1}{4} \cdot -\frac{2}{3} = \frac{1}{4} \cdot 4x \rightarrow -\frac{2}{12} = x = -\frac{1}{6}$

4. Find $f(-7)$ for $f(x) = \begin{cases} -|2x-1| & \text{if } x < -3 \end{cases}$

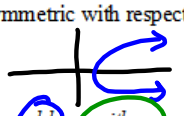
$= -|2(-7)-1|$

$= -|-14-1|$

$= -|-15| = -15$

5. Determine whether the graph of $x = 5y^2 - 2$ is symmetric with respect to the x-axis, the y-axis, or the origin.

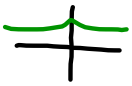
$y = \pm$ $x = ?$



6. Determine whether the function $f(x) = \frac{x^3}{x^2-4}$ is *even*, *odd*, or *neither*.

99%

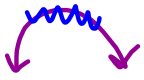
7. Determine whether $f(x) = \frac{x^2+9}{x^2+3}$ is continuous at $x = -3$. If discontinuous, identify the type of discontinuity as *infinite*, *jump*, or *removable*.



$f(-3) = \frac{(-3)^2+9}{(-3)^2+3} = \frac{9+9}{9+3} = \frac{18}{12}$

8. Describe the end behavior of $g(x) = -3x^4 - 2x$.

$\lim_{x \to -\infty} g(x) = -\infty$



$\lim_{x \to +\infty} g(x) = -\infty$

9. **FIREWORKS** The height in feet of a firework t seconds after it is launched is modeled by $h(t) = -16t^2 + 105t + 10$. Find its average speed from 1 to 3 seconds.

$h(3) = -16(3)^2 + 105(3) + 10$

$h(1) = -16(1)^2 + 105(1) + 10$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{h(3) - h(1)}{3-1} = \frac{181-99}{2}$

$= \frac{82}{2} = 41$ ft/sec

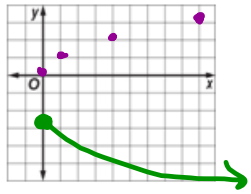
10. Given $f(x) = -3[\![x - 2.5]\!]$, what is $f(-10.75)$?

$= -3[\![-10.75 - 2.5]\!] = -3[\![-13.25]\!] = -3(-14) = 42$

11. Use transformations of the parent graph of $m(x) = \sqrt{x}$ to sketch the graph of $p(x) = -\sqrt{x} - 3$.

flip

down 3

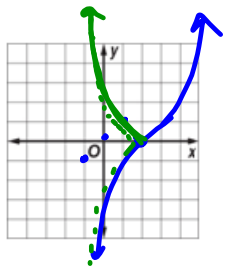


12. Describe the transformations relating the graph of $g(x) = \frac{1}{2}(x - 3)^2$ to the graph of its parent function $f(x) = x^2$.

- Shrink by $\frac{1}{2}$
- Wider x2

right 3

13. Graph $f(x) = |x^3 - 2|$.



14. If $f(x) = x - 3$ and $g(x) = \frac{1}{x^2 - 9}$, **a.** find $(f \cdot g)(x)$ and its domain. **b.** find $\left(\frac{f}{g}\right)(x)$ and its domain.

times

$(f \cdot g)(x) = (x-3) \cdot \frac{1}{x^2-9} = \frac{\cancel{x-3}}{(x+3)\cancel{(x-3)}} = \frac{1}{x+3}$ D: $x \neq \pm 3$

$\left(\frac{f}{g}\right)(x) = \frac{x-3}{\frac{1}{\cancel{x^2-9}}} \cdot \frac{x^2-9}{\cancel{x^2-9}} = (x-3)(x^2-9)$ D: $x \neq \pm 3$

15. If $f(x) = x - 3$ and $g(x) = \frac{1}{x^2-9}$, **a.** find $[f \circ g](x)$. **b.** find $[g \circ f](x)$.

$f(g(x)) = \left(\frac{1}{x^2-9}\right) - 3$

$g(f(x)) = \frac{1}{(x-3)^2-9} = \frac{1}{x^2-6x\cancel{+9-9}} = \frac{1}{x^2-6x} = \frac{1}{x(x-6)}$

$(x-3)(x-3)$

16. Find the inverse of: **a.** $f(x) = x^3 - 4$. **b.** $g(x) = \sqrt{2x+5}$

1) $y = x^3 - 4$

2) $x = y^3 - 4$

$+4 \quad +4$

3) $\sqrt[3]{x+4} = \sqrt[3]{y^3}$

$\sqrt[3]{x+4} = y = f^{-1}(x)$

$y = \sqrt{2x+5}$

$x^2 = \sqrt{2y+5}^{\,2}$

$x^2 = 2y + 5$

$-5 \quad -5$

$\frac{x^2-5}{2} = \frac{\cancel{2}y}{\cancel{2}}$

$\frac{x^2-5}{2} = g^{-1}(x)$

17. Use composite functions to determine if $f(x) = x^2 + 4$ and $g(x) = \sqrt{x} - 4$ are inverse functions.

$= x$

$f(g(x)) = (\sqrt{x}-4)^2 + 4$

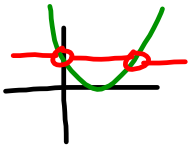
$= (\sqrt{x}-4)(\sqrt{x}-4) + 4$

$= x - 8\sqrt{x} + 16 + 4 \neq x$

$g(f(x))$

not inverses

18. Determine if $f(x) = (x - 1)^2$ is a one-to-one function. Explain why or why not.



has an inverse function
pass the Horiz. line test

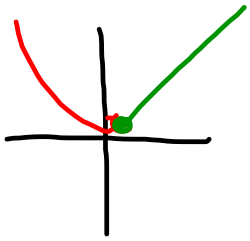
Not 1 to 1
fails H.-line test

19. FINANCES Nina saves 15% of every paycheck plus $40. Write the function that can be used to find the amount of her paycheck given the amount she saves.

$S = 0.15p + 40$
$-40 \quad -40$

$\frac{S-40}{0.15} = p \leftarrow \frac{S-40}{0.15} = \frac{\cancel{0.15}p}{\cancel{0.15}}$

20. Determine the value of k such that $f(x) = \begin{cases} 2x^2 & \text{if } x < 2 \\ x + k & \text{if } x \geq 2 \end{cases}$ is continuous when $x = 2$.



$f(2) = 2(2)^2 = 8$
$f(2) = (2) + k = 8$
$k = 6$