CBA 1 Review

1. List the domain and range of each of the following parent functions.

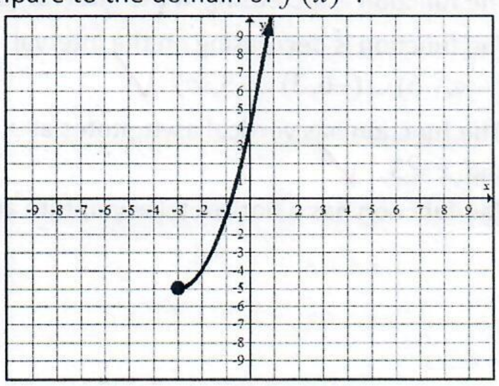
   I. $f(x)=\sqrt{x}$ D: $[0, \infty)$ R: $[0, \infty)$

   II. $f(x)=x^3$ D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

   III. $f(x)=\log x$ D: $(0, \infty)$ R: $(-\infty, \infty)$

   IV. $f(x)=2^x$ D: $(-\infty, \infty)$ R: $(0, \infty)$

2. The graph of $f(x)$ is shown below. What is the range of $f^{-1}(x)$ and how does it compare to the domain of $f(x)$ ?

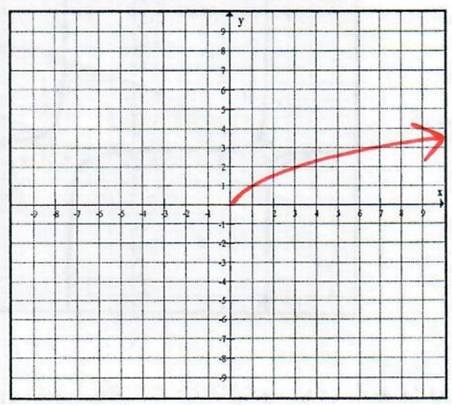


Range of the inverse is the domain of the original function $\boxed{y \geq -3}$

3. Sketch the graph of a function, $f(x)=x^{\frac{1}{n}}$, where n is a positive even integer.

ex $x^{1/2}$

$\sqrt{x}$



4. The functions *k(x)*, *f(x)*, *g(x)*, and *h(x)* are shown below.

$k(x)=x-5$ $\qquad f(x)=x+5$ $\qquad g(x)=x^2-8$ $\qquad h(x)=\sqrt{x+8}$

Which pair of functions represents a commutative relationship?

~~A.~~ *g(h(x))* and *h(g(x))*

B. *f(g(x))* and *g(f(x))*

C. *k(f(x))* and *f(k(x))*

D. *f(h(x))* and *h(f(x))*

A. $g(\sqrt{x+8}) = (\sqrt{x+8})^2 - 8$
$= x+8-8$
$= x$

$h(x^2-8) = \sqrt{x^2-8+8}$
$= \sqrt{x^2} = |x|$

(remember, this is tricky!)

C. $k(x+5) = x-5+5 = x$ ✓
$f(x-5) = x-5+5 = x$

5. Circle ALL of the true statements below.

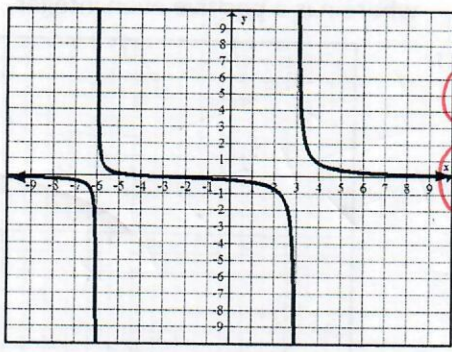
~~I.~~ $y = x$ is an odd function because it is symmetric about the ~~y-axis~~ origin.

~~II.~~ $y = x^2$ is an ~~odd~~ even function because it is symmetric about the ~~origin~~ y-axis.

III. $y = x^3$ is an odd function because it is symmetric about the origin. ✓

IV. $y = |x|$ is an even function because it is symmetric about the y-axis. ✓

6. The graph of a rational function is shown below. Circle all of the key attributes that correctly describe the rational function.



~~I.~~ The function is ~~increasing~~ it's decreasing in the interval $(3, \infty)$.

II. The function is decreasing on the interval $(-\infty, -6) \cup (-6, 3) \cup (3, \infty)$. ✓

III. The function has vertical asymptotes at $x = -6$ and $x = 3$. ✓

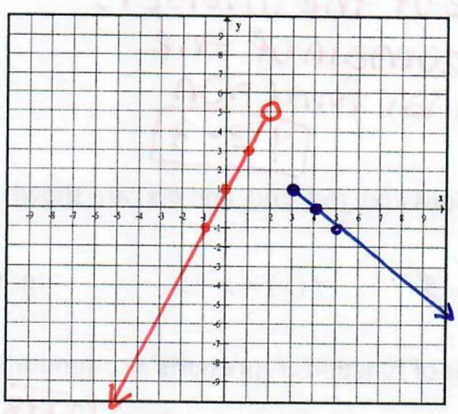
~~IV.~~ The function has a horizontal asymptote at $y = 1$.

7. Graph the following piecewise function.

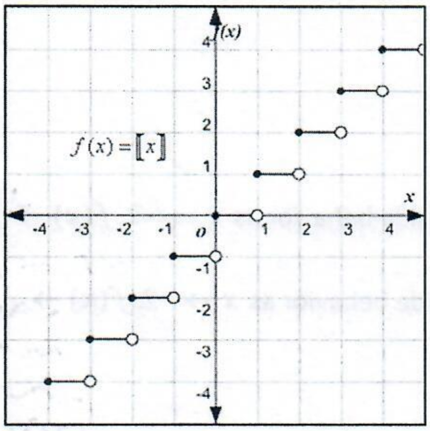
$$f(x) = \begin{cases} 2x + 1, x < 2 & \text{open circle} \\ -x + 4, x \geq 3 & \text{closed circle} \end{cases}$$

| x | y |
|---|---|
| 2 | 5 |
| 1 | 3 |
| 0 | 1 |
| -1 | -1 |

| x | y |
|---|---|
| 3 | 1 |
| 4 | 0 |
| 5 | -1 |



8. The graph of a step function is shown below. Circle the key attributes that describe the function.




~~I.~~ The function is symmetric to the y-axis.

~~II.~~ The function is symmetric to the origin. circles don't line up

~~III.~~ The function is decreasing.

~~IV.~~ The function is increasing. not at every point

V. The domain of the function is $\{x : x \in \Re\}$. ✓

~~VI.~~ The range of the function is $\{y : y \in \Re\}$.
y is only whole #s

9. The cost of the salt used to fill up the salt shakers on the tables in a restaurant is given by the function $f(x) = 8x - 2$, where x represents the number of quarts of salt used and f(x) represents the cost. If $f(5a) = 90$, what is the value of a?

$f(5a) = 8(5a) - 2$

$90 = 40a - 2$

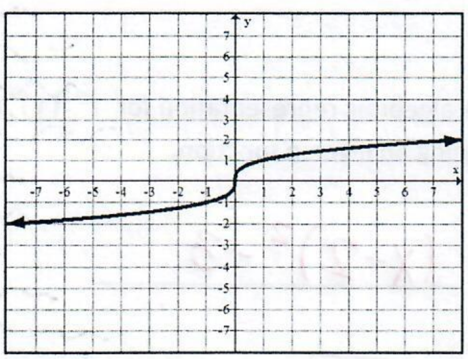
$+2 \quad\quad +2$

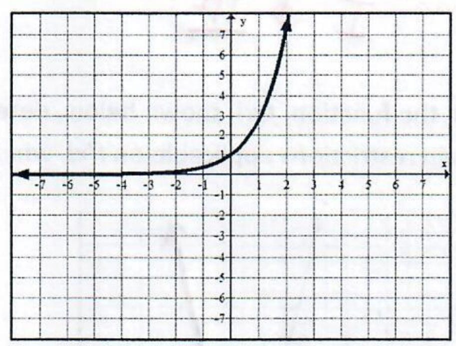
$92 = 40a$

$\frac{92}{40} = \frac{40a}{40}$

$\boxed{2.3 = a}$

10. Find the end behavior for each of the graphs.




As $x \to \infty, y \to$ $\infty$

As $x \to -\infty, y \to$ $-\infty$

As $x \to \infty, y \to$ $\infty$

As $x \to -\infty, y \to$ $0$

11. Find an x-value where the following function is discontinuous.

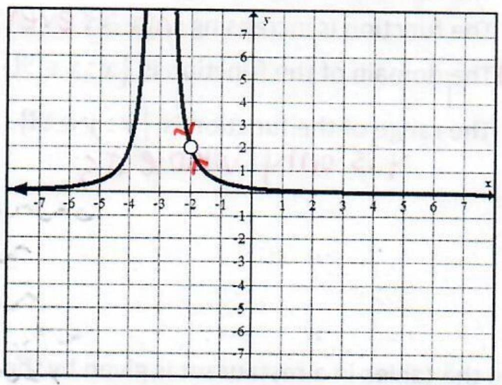
where denominator = 0

$$f(x) = \frac{3x^2 - 2x - 5}{x + 6}$$

$x + 6 = 0$

$\boxed{-6}$

12. Describe the following behavior.



- Right side behavior as $x \to -2, f(x) \to$ 2
- Left side behavior as $x \to -2, f(x) \to$ 2

13. Given the function $g(x) = (2x+1)^2 - 4$ and $g(x) = f(h(x))$, which pair of functions could represent $f(x)$ and $h(x)$?

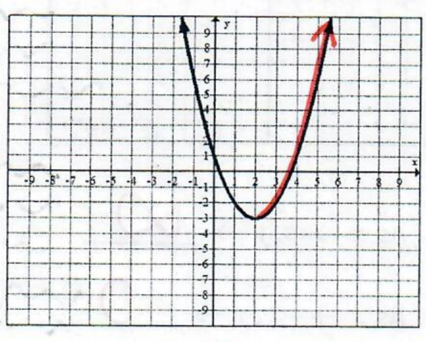
✓ I. $f(x) = x - 4$ and $h(x) = (2x+1)^2$ $\quad f((2x+1)^2) = (2x+1)^2 - 4$

✓ II. $f(x) = x^2 - 4$ and $h(x) = 2x + 1$ $\quad f(2x+1) = (2x+1)^2 - 4$

III. $f(x) = x - 4$ and $h(x) = x^2 - 4$ $\quad f(x^2 - 4) = x^2 - 4 - 4 = x^2 - 8$

I & II

14. Given the function, *f(x)*, shown below, determine the algebraic representation for $f^{-1}(x)$, and any domain restrictions applicable on *f(x)*, when determining an inverse function.



$f(x) =$ $(x-2)^2 - 3$

$f^{-1}(x) =$ $\sqrt{x+3} + 2$

Domain Restriction on $f(x)$ $x \geq 2$

$x = (y-2)^2 - 3$

$\sqrt{x+3} = \sqrt{(y-2)^2}$

$\sqrt{x+3} \underset{+2}{} = y - 2 \underset{+2}{}$

$\sqrt{x+3} + 2 = y$