Name: ______________________ **Precalculus Unit 3, Lesson 7**

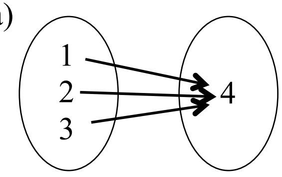
Aim: How do we find inverses and are they always functions?

I. Do Now:

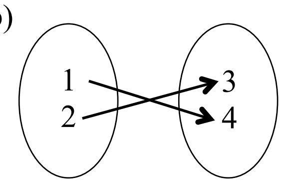
1. Given $f(x)=\frac{1}{2}x+7$ find $f^{-1}(x)$ algebraically .

2. For each mapping,
   (i) Is it a function?
   (ii) Is its inverse a function? Why or why not?

(a)



(b)



II. Motivation: Consider $y=x^2$. Is it a function? Is its inverse a function?

Definition: A function *f* is a *one-to-one function* if, for all *a* and *b* in its domain, $f(a)=f(b)$ implies that $a=b$ (i.e., *y* values are only equal when *x* values are equal).

A function *f* has an inverse function $f^{-1}(x)$ ____

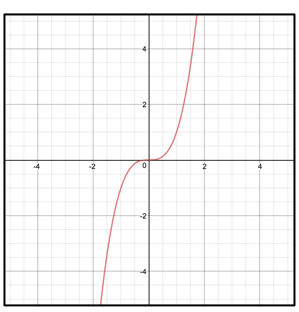
III. Graphs

A. To form the inverse of a function using its graph, use the transformation: ____________________

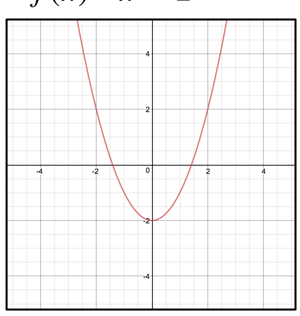
B. To determine whether a graph represents a one-to-one function use:__________________________

Determine whether each of the following functions is one-to-one. Then, use either A or B above to determine whether the function has an inverse that is a function. Sketch the graph of the inverse function, if it exists.

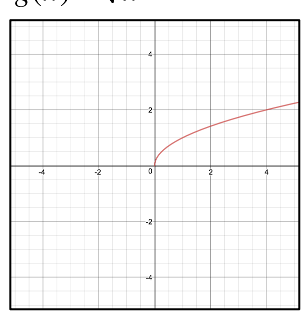
3. $f(x)=x^3$



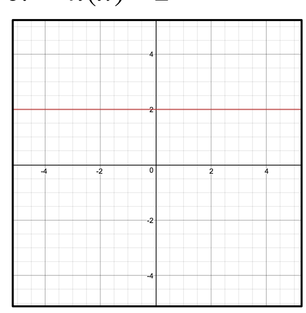
4. $f(x)=x^2-2$



5. $g(x)=\sqrt{x}$



6. $h(x)=2$



Note:

If a function is increasing on its entire domain, then is $f(x)$ one-to-one and $f^{-1}(x)$ is a function.

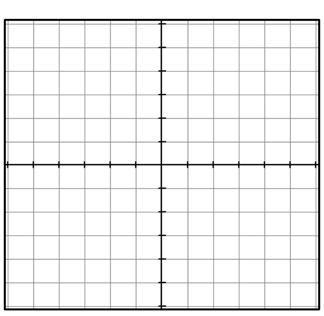
(Example: ____)

If a function is decreasing on its entire domain, then is $f(x)$ one-to-one and $f^{-1}(x)$ is a function.

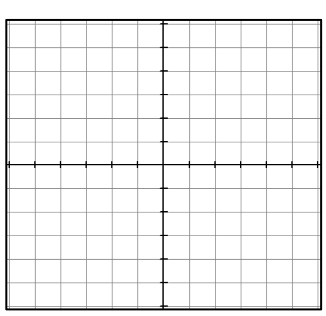
(Example: ____)

IV. Applications: If the inverse exists, find the inverse algebraically and graphically.

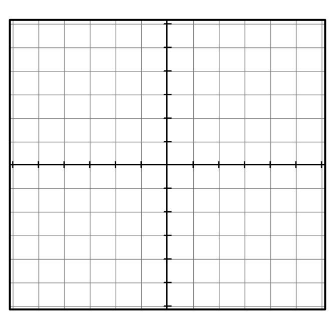
7. $f(x)=\dfrac{5-3x}{2}$



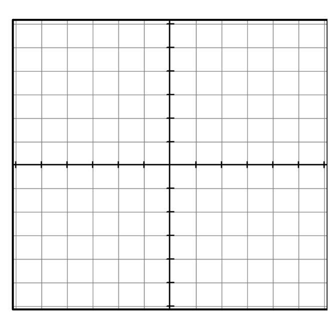
8. $f(x)=x^3+1$



9. $f(x)=x^2+3$



10. $g(x)=\sqrt{x}-1$



HW22
- Read pages 63 – 66.
- p. 67: 9, 45, 47, 49, 55, 76, 77
- p. 56: 18, 25