MAT 161 – CLASS NOTES – Section 2.7: Inverse Functions

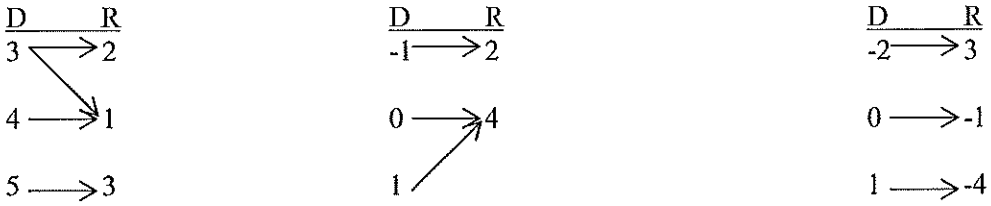
1) **Function** – a relationship where each input has **one** distinct output

2) **One-to-one function**

3) **Inverse** – If f is a one-to-one function, then the **inverse** of f, denoted $f^{-1}(x)$, is the function formed by reversing all the ordered pairs in f. If f is not one-to-one, then it does not have an inverse.

   a) Domain of $f^{-1}(x)$ = Range of f
   b) Range of $f^{-1}(x)$ = Domain of f

4) Examples



5) Does the function have an inverse function? If so, complete a table for $y = f^{-1}(x)$.

a)

x	-3	-2	-1	0	1	2
$f(x)$	10	6	4	1	3	10

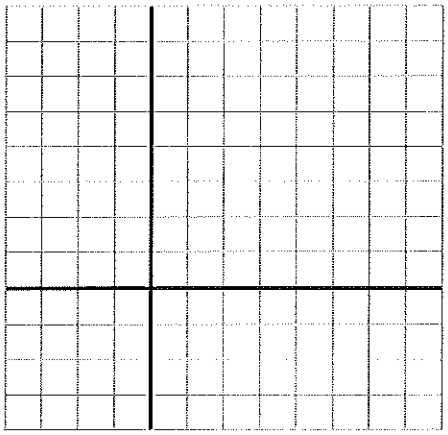
b)

x	-3	-2	-1	0	1	2
$f(x)$	-10	-7	-4	-1	2	5

6) Determine if $f(x)=\sqrt{x+3}$ is a one-to-one function. If so make a table for and graph $f^{-1}(x)$.

x				
$f(x)$				

x				
$f^{-1}(x)$				

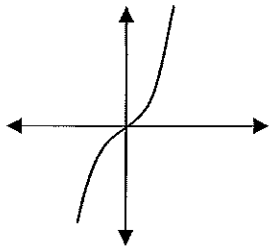


7) **Horizontal Line Test**

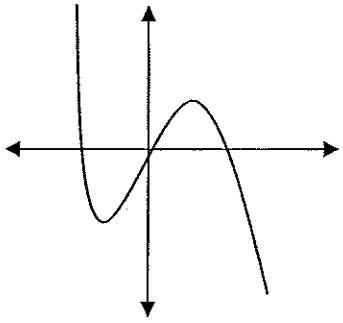
If a horizontal line can be drawn such that it touches more than one point on the graph, then it is **not one-to-one function**.

8) Does the function have an inverse function?

a)



b)



9) To find a functions inverse

a) Be sure the function is one-to-one.
b) Set $y = f(x)$
c) Interchange x and y
d) Solve for y – this is $f^{-1}(x)$

10) Find each functions inverse:
a) $f(x) = -3x - 2$

b) $f(x) = \frac{3x+1}{x}$

c) $f(x)=x^2-1, x\geq 0$

11) If 2 functions are inverses of each other then $f(f^{-1}(x))=x$ and $f^{-1}(f(x))=x$.

12) Verify that $f(x)=-\frac{1}{2}x+2$ and $g(x)=-2x+4$ are inverses.