COLLEGE ALGEBRA NAME: Amanda Lord

GPS # 21 **2.7 INVERSE FUNCTIONS** Class Time: 11:30 - 12:45 Date: 2/19/08

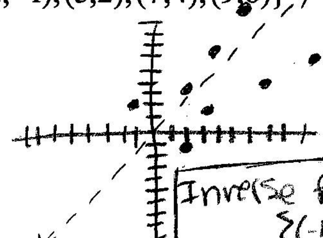
[illegible]

Useful Guidelines:

* **One-to-one function:** A function whose inverse is also a function. [If $x_1 \neq x_2$, then $f(x_1) \neq f(x_2)$]
* Horizontal-line test: If every horizontal line intersects the graph of *f* in at most one point, then *f* is one-to-one.
* The graph of a function *f* and its inverse f^{-1} are symmetric with respect to the line $y = x$.
* To find the inverse, $f^{-1}(x)$, of a one-to-one function:
  (1) Let $y = f(x)$
  (2) Interchanging the variables *x* and *y*
  (3) Solve for *y* and replace *y* by $f^{-1}(x)$
  (4) Check the result by showing that $f^{-1}(f(x)) = x$ and $f(f^{-1}(x)) = x$
* To find the range of a one-to-one function *f*, find the domain of the inverse function f^{-1}.
  [Domain of f = Range of f^{-1}; Range of f = Domain of f^{-1}.]

1. Determine whether the given function is one-to-one. If it is one-to-one, find the inverse.
[Hint: Check to see if there are ordered pairs with different first coordinates and the same second coordinate. If there are, the function is not one-to-one. We can find its inverse by interchanging the x- and y-coordinates in each ordered pair.]

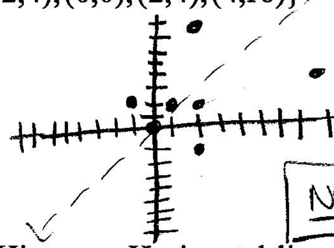
(a) $\{(2,-1),(3,2),(7,4),(9,6)\}$



one-to-one function

Inverse function: $\{(-1,2),(2,3),(4,7),(6,9)\}$

(b) $\{(-2,4),(0,0),(2,4),(4,16)\}$

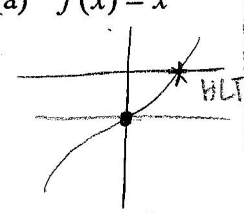


not a one-to-one function

NO inverse function

2. Use the graph to determine whether the function is one-to-one. [Hint: use Horizontal-line test]

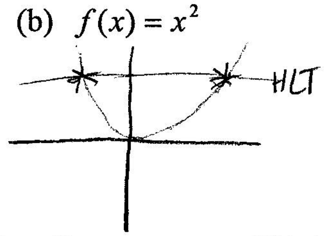
(a) $f(x) = x^3$



is a function

One-to-one function

(b) $f(x) = x^2$



not a ~~function~~ one-to-one

no inverse function

not one-to-one

3. In the following problems, determine whether the function *f* is one-to-one. If it is, find the inverse of each function.

(a) $\sqrt{x-3}$

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

it is a function

	Inverse
d: $[3, \infty)$	d: $[0, \infty)$
r: $[0, \infty)$	r: $[3, \infty)$

one-to-one function

(b) $\dfrac{3}{x-2}$

$y = \dfrac{3}{x-2}$

$\dfrac{x}{1} = \dfrac{3}{y-2} \Rightarrow (y-2)x = 3$

$y - 2 = \dfrac{3}{x}$

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

	Inverse
d: $\{x \mid x \neq 2\}$	d: $\{x \mid x \neq 0\}$
r: $\{y \mid y \neq 0\}$	r: $\{y \mid y \neq 2\}$