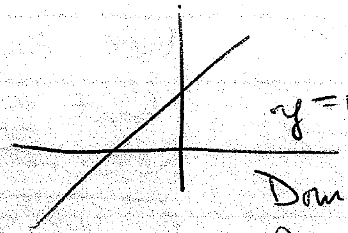
Sec. 3.3 notes — Fcn. Characteristics

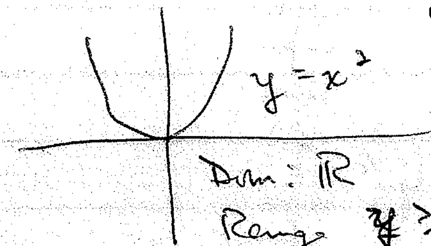
odd
even
one-one
inverses



$y = mx + b$

Dom: $\mathbb{R} = x$

Range: $\mathbb{R} = y$



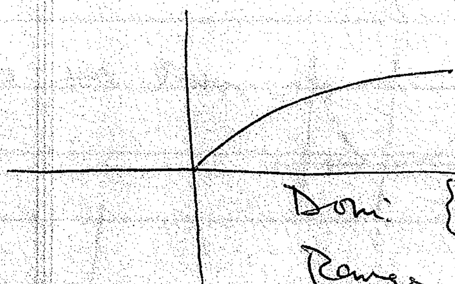
$y = x^2$

Dom: $\mathbb{R}$

Range $y \geq 0$

$\{y \in \mathbb{R} \mid y \geq 0\}$

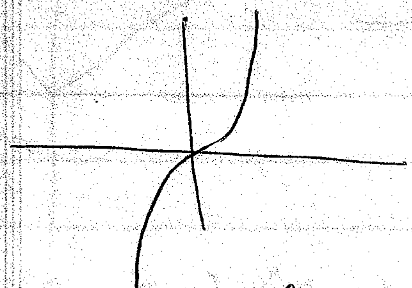
$\{y \mid y \geq 0\}$



$y = \sqrt{x}$

Dom: $\{x \mid x \geq 0\}$

Range $\{y \mid y \geq 0\}$



$y = x^3$

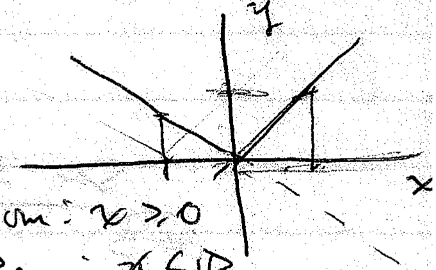
x	y
1	1
-1	-1

Dom: $\mathbb{R}$

Range: $\mathbb{R}$

odd

$y = |x|$



Dom: $x \geq 0$

Range: $y \in \mathbb{R}$

even

Def A fcn. is odd if for all

$x \in \text{Dom}, \quad f(x) = -f(-x) \iff -f(x) = f(-x)$

ex $f(x) = x^3$

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

Def A fcn. is even if for $x \in \text{Dom}$,

$f(-x) = f(x)$

ex $f(x) = x^2$

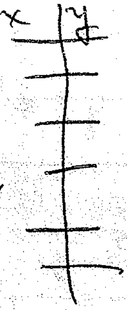
$f(-x) = (-x)^2 = x^2 = f(x)$

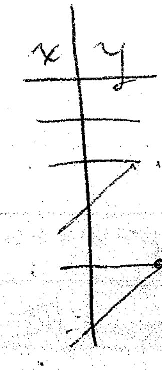
ex $y = |x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$ Dom

$y = x \qquad y = -x$

One-one fcns

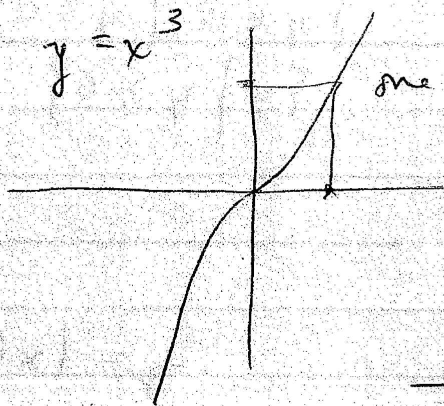
"Rule that gives a unique x for each y."





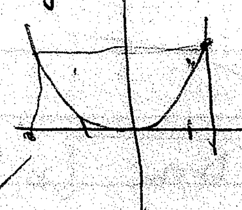
Fcn. Rule that gives a unique y for each x but not necessarily a unique x for each y

$y = x^3$

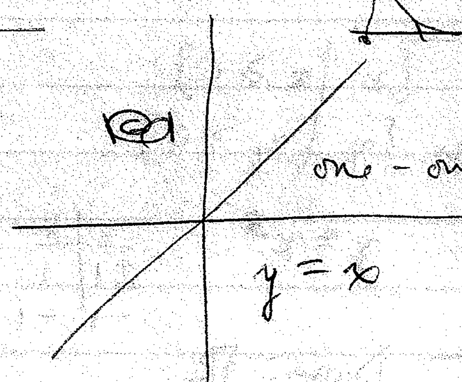


one-one

$y = x^2$

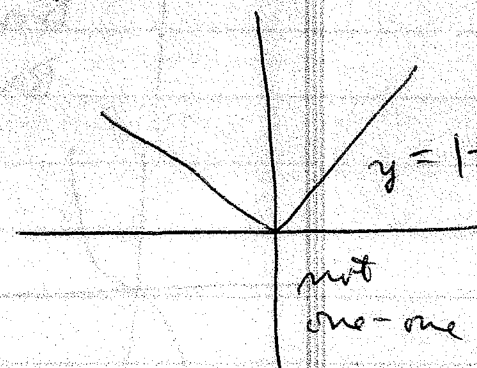


not one-one



one-one

$y = x$



$y = |x|$

not one-one

Sec 3.3

#5 f contains $(-1,3), (6,2), (-2,-3)$

(a)

x	$y=f(x)$
-1	3
6	2
-2	-3
$+1$	3
-6	2
$+2$	-3

If f is even, then by def, $f(-x) = f(x)$

~~i.e., $f(3) = -1$~~

i.e. $f(-1) = 3$, so $f(+1) = 3$

$f(6) = 2$, so $f(-6) = 2$

$f(-2) = -3$, so $f(+2) = -3$

$(1,3), (-6,2)\ (2,-3)$

(b) $(-1,3)\ (6,2)\ (-2,-3),\ (1,-3)\ (-6,-2)\ (+2,+3)$

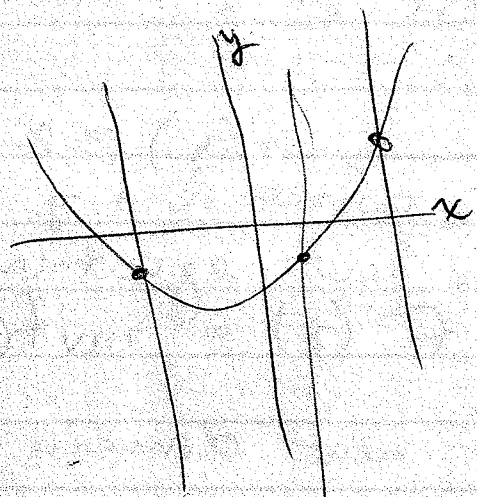
If f is odd, then by def

$f(-x) = -f(x)$

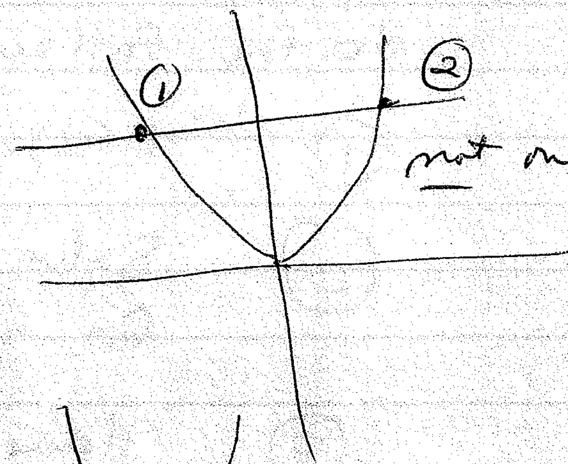
$f(-(-1)) \stackrel{def}{=} -f(-1) = -3$

$f(1)$

Vertical line test for functions

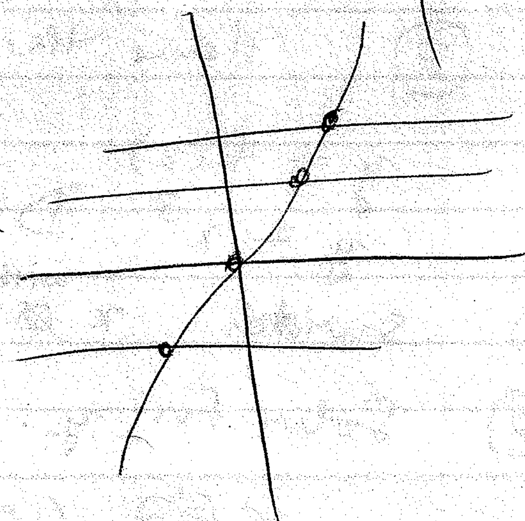


Horizontal line test for one-one functions

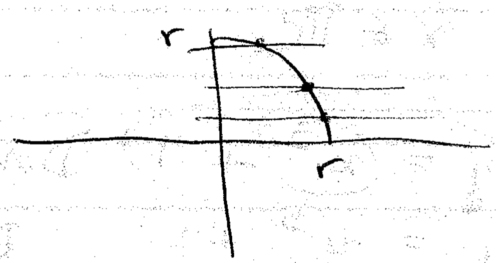


not one-one

one-one



"One-one fcns are fcns in both directions." That is: $f(x) = y$ gives an <u>inverse fcn</u> $f^{-1}(x) = y$



quarter circle

Dom

$0 \le x \le r$

$0 \le y \le r$