

LIBRARY OF FUNCTIONS

1) **LINEAR FUNCTIONS:** $f(x) = mx + b$ m and b are real numbers

domain: $(-\infty, \infty)$

range: $(-\infty, \infty)$

graph: line with slope m , y -intercept b

increasing if: $m > 0$

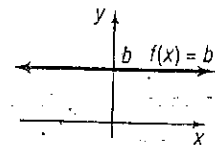
decreasing if: $m < 0$

a) **CONSTANT FUNCTION:** $f(x) = b$ b is a real number

domain: $(-\infty, \infty)$

range: $\{b\}$

graph: horizontal line with y -intercept b



it is an EVEN function.

b) **IDENTITY FUNCTION:** $f(x) = x$

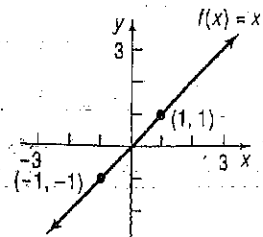
domain: $(-\infty, \infty)$

range: $(-\infty, \infty)$

graph: line with $m = 1$, intercept $(0, 0)$

(Bisects Q I and Q III)

it is an ODD function and it is always increasing

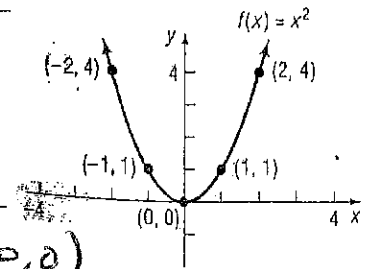


2) **SQUARE FUNCTION:** $f(x) = x^2$

domain: $(-\infty, \infty)$

range: $[0, \infty)$

graph: parabola with vertex $(0, 0)$



it is an EVEN function that is decreasing on the interval $(-\infty, 0)$ and increasing on the interval $(0, \infty)$

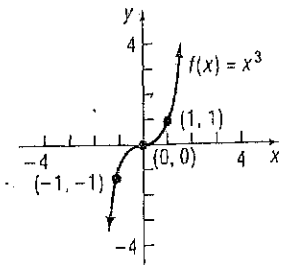
3) **CUBE FUNCTION:** $f(x) = x^3$

domain: $(-\infty, \infty)$

range: $(-\infty, \infty)$

intercept is $(0, 0)$

it is an ODD function and is always increasing



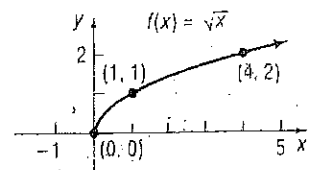
4) **SQUARE ROOT FUNCTION:** $f(x) = \sqrt{x}$

domain: $x \geq 0$ $[0, \infty)$

range: $y \geq 0$ $[0, \infty)$

intercept is $(0, 0)$

it is neither even or odd and is increasing on the interval $(0, \infty)$



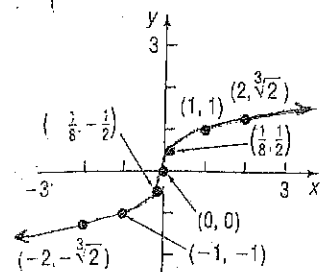
5) **CUBE ROOT FUNCTION:** $f(x) = \sqrt[3]{x}$

domain: $(-\infty, \infty)$

range: $(-\infty, \infty)$

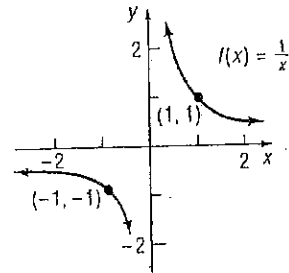
intercept is $(0, 0)$

it is an ODD function that is increasing on the interval $(-\infty, \infty)$



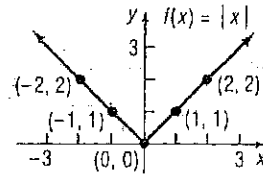
5) RECIPROCAL FUNCTION: $f(x) = \frac{1}{x}$

domain: $\{x | x \neq 0\}$
 range: $\{y | y \neq 0\}$
 intercepts: none
 it is an ODD function and is decreasing on the intervals $(-\infty, 0)$ and $(0, \infty)$



6) ABSOLUTE VALUE FUNCTION: $f(x) = |x|$

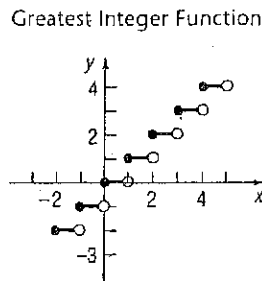
domain: $(-\infty, \infty)$
 range: $[0, \infty)$
 intercept is $(0, 0)$
 it is an EVEN function that is decreasing on the interval $(-\infty, 0)$ and increasing on the interval $(0, \infty)$



7) GREATEST INTEGER FUNCTION: $f(x) = \text{int}(x) = \text{Greatest integer less than or equal to } x$ ($f(x) = [x]$)

domain: $(-\infty, \infty)$
 range: $\{\text{integers}\}$
 y intercept is $(0, 0)$
 x intercepts lie in the interval $[0, 1)$
 it is neither even or odd
 it is also called a STEP function

x	y = f(x) = int(x)	(x, y)
-1	-1	(-1, -1)
$-\frac{1}{2}$	-1	$(-\frac{1}{2}, -1)$
$-\frac{1}{4}$	-1	$(-\frac{1}{4}, -1)$
0	0	(0, 0)
$\frac{1}{4}$	0	$(\frac{1}{4}, 0)$
$\frac{1}{2}$	0	$(\frac{1}{2}, 0)$
$\frac{3}{4}$	0	$(\frac{3}{4}, 0)$



(greatest integer ≤ 3.6)

ex) $\text{int}(3.6) = 3$
 $\text{int}(1) = 1$
 $\text{int}(\frac{3}{4}) = 0$
 $\text{int}(-1.4) = -2$

PIECEWISE FUNCTION:

$$f(x) = \begin{cases} x^3 & \text{if } x < 0 \\ 3x+2 & \text{if } x \geq 0 \end{cases}$$

FIND

- a) $f(2) \rightarrow 3(2)+2 = 8$
- b) $f(-1) \rightarrow (-1)^3 = -1$
- c) $f(0) \rightarrow 3(0)+2 = 2$