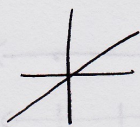


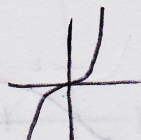
3.4 Library of Functions

p.1

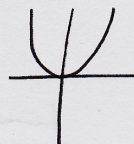
Previously:



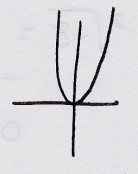
$y = x$



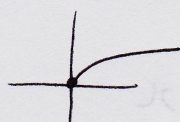
$y = x^3$



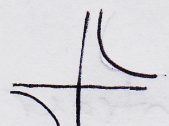
$y = x^2$



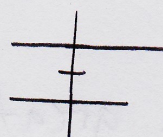
$y = x^4$



$y = \sqrt{x}$



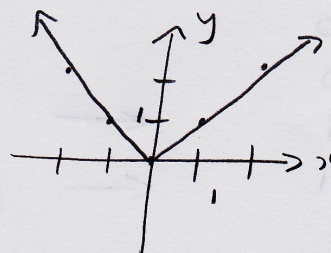
$y = \frac{1}{x}$



$y = c$

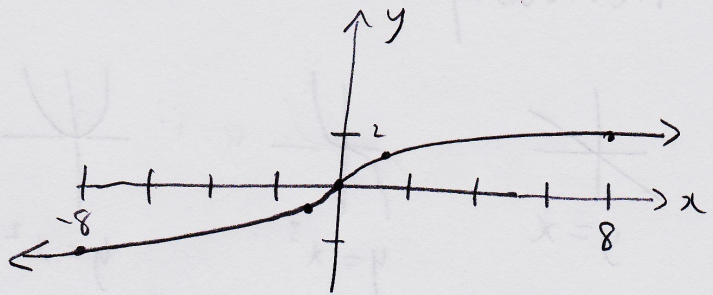
Ex: Graph $y = |x|$

x	$y = x $
-2	$ -2 = 2$
-1	1
0	0
1	1
2	2



Ex: Graph $y = \sqrt[3]{x}$ p. 2

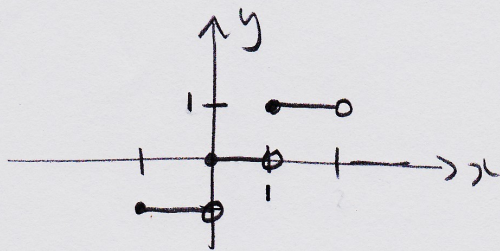
x	$y = \sqrt[3]{x}$
-8	$\sqrt[3]{-8} = -2$
-1	-1
0	0
1	1
8	2



Ex: $f(x) = \text{int}(x) = \text{greatest integer } \leq x$

x	$y = \text{int}(x)$
-1	-1
-0.5	-1
0	0
0.5	0
1	1
1.5	1

$\leftarrow 1 \leq 1 \quad 2 \notin 1$
 $\leftarrow 1 \leq 1.5 \quad 2 \notin 1.5$



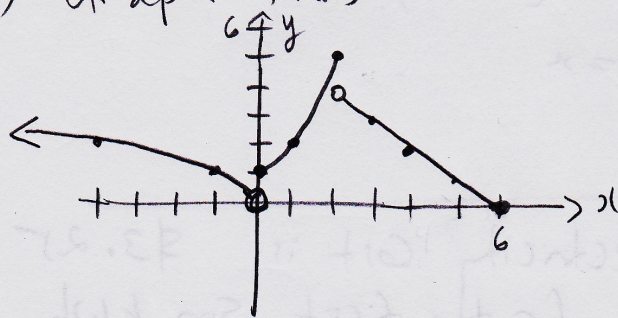
Piecewise - Defined Functions (p.3)

Ex: $f(x) = \begin{cases} \sqrt{-x} & , x < 0 \\ x^2 + 1 & , 0 \leq x \leq 2 \\ 6 - x & , 2 < x \leq 6 \end{cases}$

a) Complete the table:

	x	y
$y = \sqrt{-x}$	-4	$\sqrt{4} = 2$
	-1	1
$y = x^2 + 1$	0	1
	1	2
	2	5
$y = 6 - x$	3	3
	4	2

b) Graph $f(x)$



c) Find the intercepts

x-intercept (6,0)

y-intercept (0,1)

d) Is $f(x)$ continuous?

p.4

No (jumps at $x=0$ and $x=2$)

e) Domain of $f(x)$?

$$-\infty < x \leq 6$$

$$(-\infty, 6]$$

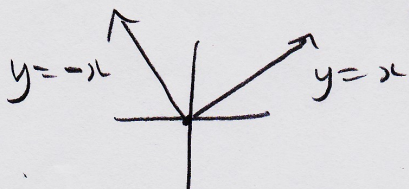
f) Range of $f(x)$?

$$0 \leq y < \infty$$

$$[0, \infty)$$

Note: $f(x) = |x|$ is a piecewise-defined function.

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



Ex: Monthly electricity cost is \$3.25 plus 8.2¢/kwh for the first 500 kwh plus 12.3¢/kwh beyond 500 kwh. Express as a function.

Let $y = \text{cost} (\$)$

$x = \text{usage (kwh)}$

$$\text{\$/kWh} \cdot \text{kWh} = \$$$

p. 5

$$y = \begin{cases} 3.25 + 0.082x, & 0 \leq x \leq 500 \\ 3.25 + 0.082(500) + 0.123(x-500), & x > 500 \end{cases}$$

$$\# \text{ kWh @ } 8.2 \text{¢} = 500$$

$$12.3 \text{¢} = x - 500$$