

Library of key functions – See pages 258-259 of the text book

Function	$f(x) = x^2$
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

Function	$f(x) = x^3$
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

Function	$f(x) = \sqrt{x}$
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

Function	$f(x) = \sqrt[3]{x}$
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

Function	$f(x) = \frac{1}{x}$
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

Function	$f(x) = x $
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

Function	$f(x) = \text{int}(x)$
Domain	
Range	
Intercepts	
Odd/Even	
Increasing	
Decreasing	
Local minima	
Local maxima	
Asymptotes	
Graph	

P. 263 #9-16

Piecewise functions

- In definition, typically the *domain* is split into several pieces
- A formula is given for each part
- **Evaluating a piecewise function**
 - Examine x to decide which piece of the domain it falls in (if any!)
 - Apply the corresponding formula
- **Graphing a piecewise function**
 - Look at each piece of the domain separately
 - Graph that piece according to the formula
 - Examine the endpoints to decide whether to apply empty circle, full circle, or “arrow”

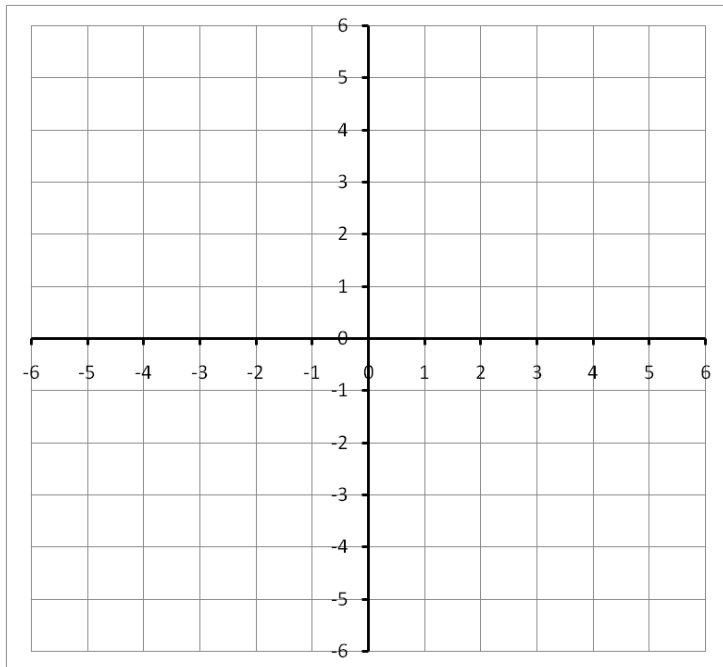
P. 263, #30.

$$f(x) = \begin{cases} 3x & \text{if } x \neq 0 \\ 4 & \text{if } x = 0 \end{cases}$$

(a) Domain

(b) Intercepts

(c) Graph



(d) range

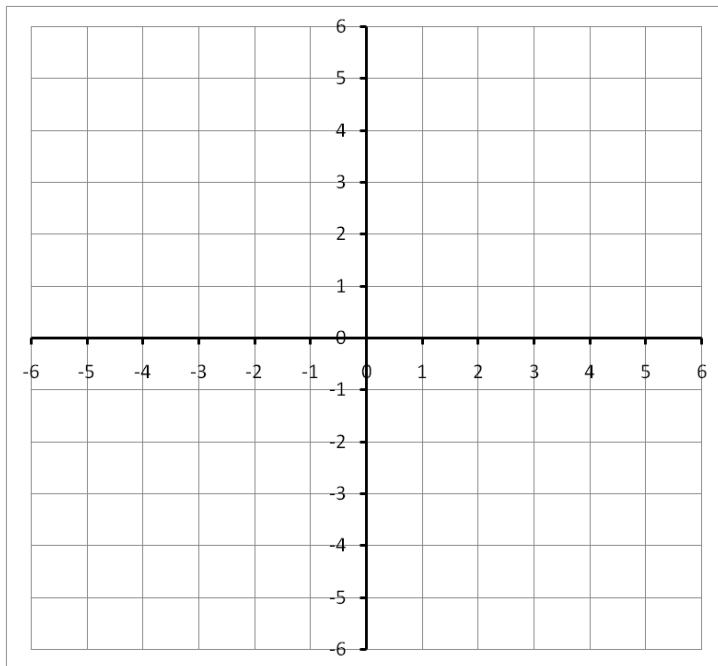
P. 263, #34.

$$f(x) = \begin{cases} 2x + 5 & -3 \leq x < 0 \\ -3 & x = 0 \\ -5x & x > 0 \end{cases}$$

(a) Domain

(b) Intercepts

(c) Graph



(d) range

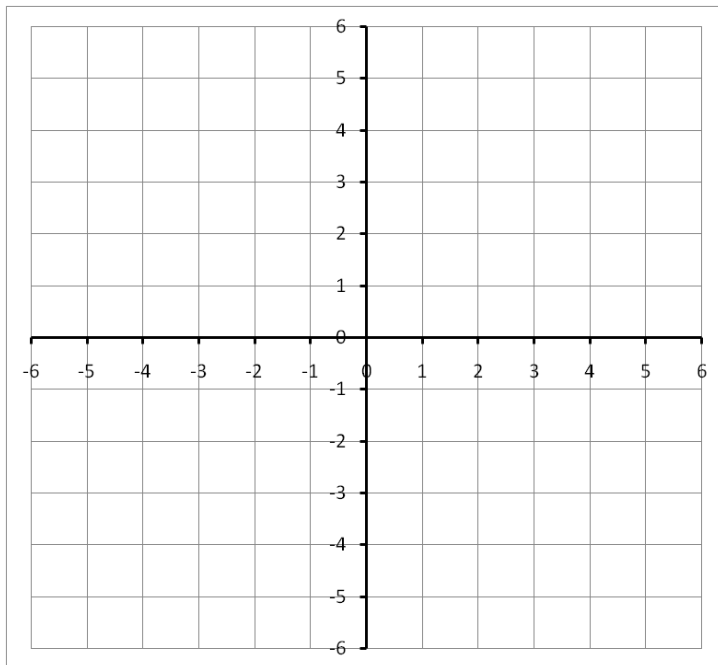
P. 263 #40

$$f(x) = \text{int}(2x)$$

(a) Domain

(b) Intercepts

(c) Graph



(d) range

Applications that involve (piecewise) functions

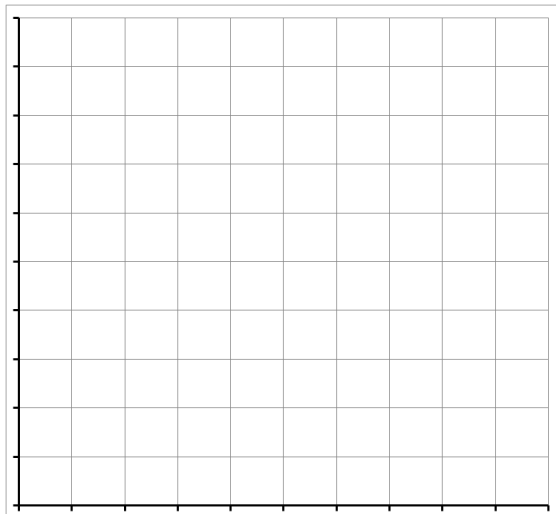
What are you being asked?	Define as y or $f(x)$ – but wait a bit to decide the formula
What is the independent variable?	Define as y
What do you know about how to compute $f(x)$? Does the formula change for different regions of x ?	List the regions. Goal is a formula for each region – but you may have to derive it. Read the information carefully It may be useful to sketch endpoints and think about how to connect them, with clues from the problem statement.
The problem may involve linear functions	Rules give you \$ / hour, \$ / gallon, miles / hour, etc....

P. 264 #50 (sort of)

Schedule X—

	If Taxable Income Is over	But Not over	The Tax Is This Amount	Plus This %	Of the Excess over
Single	\$0	\$7,150	\$0.00	10%	\$0.00
	\$7,150	\$29,050	\$715.00	15%	\$7,150
	\$29,050	\$70,350	\$4000.00	25%	\$29,050
	\$70,350	\$146,750	\$14,325.00	28%	\$70,350
	\$146,750	\$319,100	\$35,717.00	33%	\$146,750
	\$319,100	—	\$92,592.50	35%	\$319,100

Write this information a piecewise function and sketch its graph.



P. 264 #48

48. Cost of Natural Gas In May 2003, Nicor Gas had the following rate schedule for natural gas usage in single-family residences:

Monthly customer charge	\$6.45
Distribution charge	
1st 20 therms	\$0.2012/therm
Next 30 therms	\$0.1117/therm
Over 50 therms	\$0.0374/therm
Gas supply charge	\$0.7268/therm

- What is the charge for using 40 therms in a month?
- What is the charge for using 202 therms in a month?
- Construct a function that gives the monthly charge for x therms of gas.
- Graph this function.

SOURCE: Nicor Gas, Aurora, Illinois, 2003.