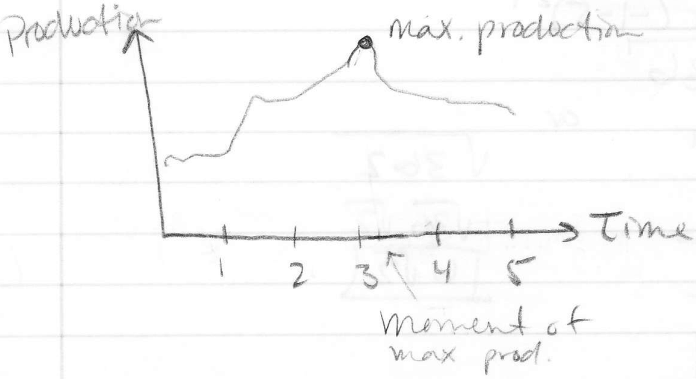
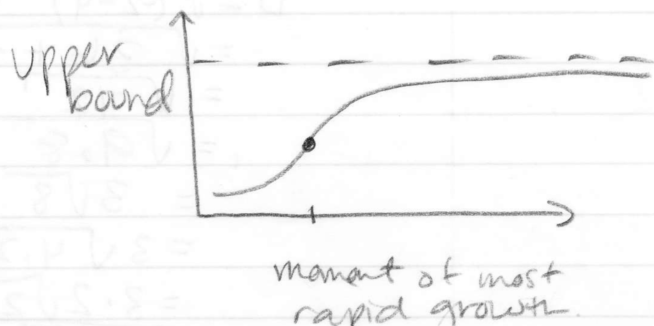
HW #2
1.2
1.3
1.4

~~1.2 - 9, 10, 11, 15, 19, 25, 27, 29, 31, 37, 38, 45~~
~~1.3 - 1, 4, 7, 9, 11, 18, 19, 23, 25, 35, 37, 45~~ 1.4 - ~~7, 10, 13, 17, 55~~

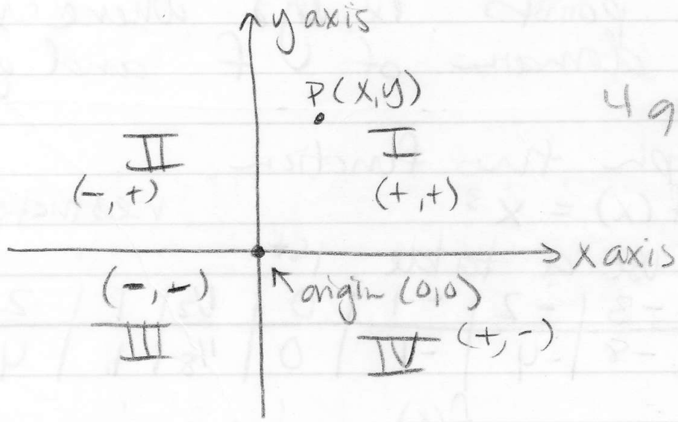
Section 1.2 The graph of a function

Graphs are useful for displaying / interpreting information.





Cartesian (Rectangular) Coordinate System (De Cartes)

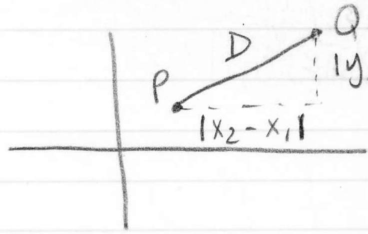


4 quadrants

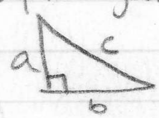
Ordered Pairs

(x coord., y coord)
↔ ↕

Formula for the distance between two points



Pythagorean Theorem



$a^2 + b^2 = c^2$

$$D^2 = |x_2 - x_1|^2 + |y_2 - y_1|^2$$

Jump to here →

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find the distance between

ex. $P(4,5)$ and $Q(-2,-1)$

$x_1\ y_1 \qquad x_2\ y_2$

$D = \sqrt{(-2-4)^2 + (-1-5)^2}$

$= \sqrt{36+36}$

$= \sqrt{72}$ or

$= \sqrt{9 \cdot 8}$ $\qquad \sqrt{36 \cdot 2}$

$= 3\sqrt{8}$ $\qquad \sqrt{36}\sqrt{2}$

$= 3\sqrt{4 \cdot 2}$ $\qquad \boxed{6\sqrt{2}}$

$= 3 \cdot 2\sqrt{2}$

$\boxed{= 6\sqrt{2}}$

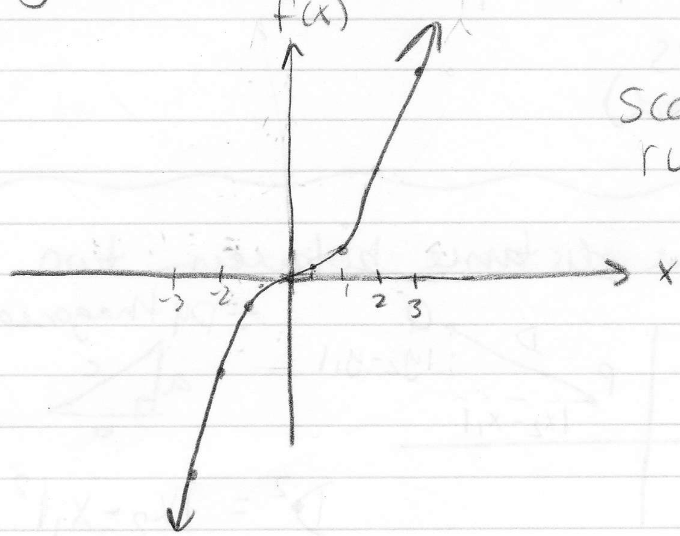
The graph of $f(x)$ consists of all points (x, y) where x is in the domain of f and $y = f(x)$. $(x, f(x))$

Graph the function

ex. $f(x) = x^3$ restricted domain? Nope TR

Well use a table 1st

x	-3	-2	-1	0	1/2	1	2	3
y	-8	-4	-1	0	1/8	1	4	8



scale & lable

ruler & graph paper

Piecewise functions

Different functions are defined for different pieces of the domain

Graph

$$f(x) = \begin{cases} 9-x & \text{if } x \le 2 \\ x^2+x-2 & \text{if } x>2 \end{cases}$$

$y = mx+b$

~~(9,0) x int~~ Not on graph

Line $f(x) = -x+9$ $m=-1$ $(0,9)$ yint

$f(2) = -(2)+9$

$=7$ $(2,7)$

Let's find x intercept $\Rightarrow$ $f(x)=0$ $0=-x+9$

$x=9$

y intercept $\Rightarrow$ $x=0$

Parabola $f(x)=x^2+x-2$ * opens upward since leading coefficient is positive.

Lets plot points

x	2	3	4
y	4	10	18

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

$=4+2-2$

$=4$

$f(3) = (3)^2+(3)-2$

$=9+1$

$=10$

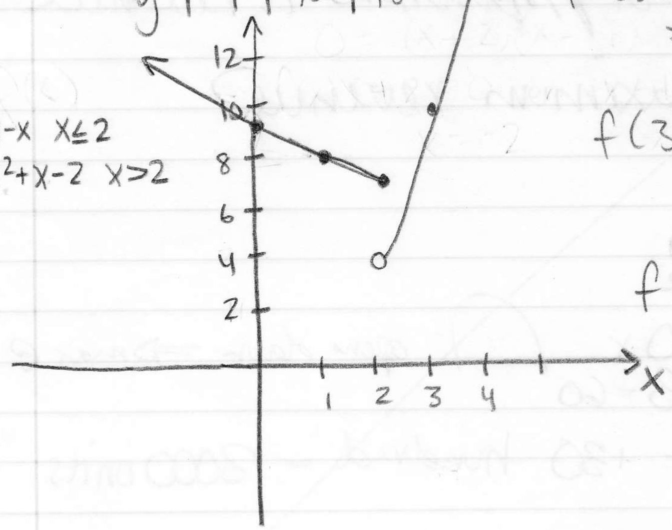
$f(4) = (4)^2+(4)-2$

$=16+4-2$

$=20-2$

$\boxed{=18}$

$f(x) = \begin{cases} 9-x & x \le 2 \\ 2x^2+x-2 & x>2 \end{cases}$



* $f(x) = x^2+2x-15$

→

* Tables can get tedious so we learn techniques for sketching curves.

Parabolas (U shape)

$f(x) = Ax^2 + Bx + C \quad A \neq 0$

If $A > 0$ (pos) opens up U

$A < 0$ (neg) opens down ∩

Domain $\mathbb{R}$

Range $a > 0$ $[k, \infty)$

$a < 0$ $(-\infty, k]$

Vertex → (h, k)

Vertex $x = \frac{-B}{2A}$ $\left(\frac{-B}{2A}, f\left(\frac{-B}{2A}\right)\right)$

↑ x value ↑ y value

* Intercepts

x-int ⇒ $y = 0$ or $f(x) = 0$

y-int ⇒ $x = 0$

a.o.s. $x = h$

Skip!!

ex. A manufacturer determines the following demand function $p = 60 - x$ dollars for each x hundred units are produced.

a) At what level of production is revenue maximized?

b) what is the maximum revenue?

a) $R(x) = xp(x)$

$= x(60 - x)$

$= 60x - x^2$

$R(x) = -x^2 + 60x$ ∩ opens down ⇒ max @ vertex

$A = -1 \quad B = 60$

$x = \frac{-60}{2(-1)} = +30$ hundred = 3000 units

3000

Sentence!

b) Max revenue at 30 units

$R(30) = 30(60 - 30)$

$= 30(30)$ \$90,000.

Sentence!

1.2
4a

$f(x) = x^2 + 2x - 15$

$a = 1 \quad b = 2 \quad c = -15$

Opens up

Vertex $\boxed{(-1, -16)}$

$h = \frac{-b}{2a} = \frac{-2}{2(1)}$

$= -1$

$k = f(-1)$

$= (-1)^2 + 2(-1) - 15$

$= 1 - 2 - 15$

$= 1 - 17$

$= -16$

Zeros $f(x) = 0$

$0 = x^2 + 2x - 15$

$0 = (x+5)(x-3)$

$x = -5, 3$

$\boxed{(-5, 0)\ (3, 0)}$

Yint $x = 0$

$f(0) = -15$

$\boxed{(0, -15)}$