Logistic Functions & Models
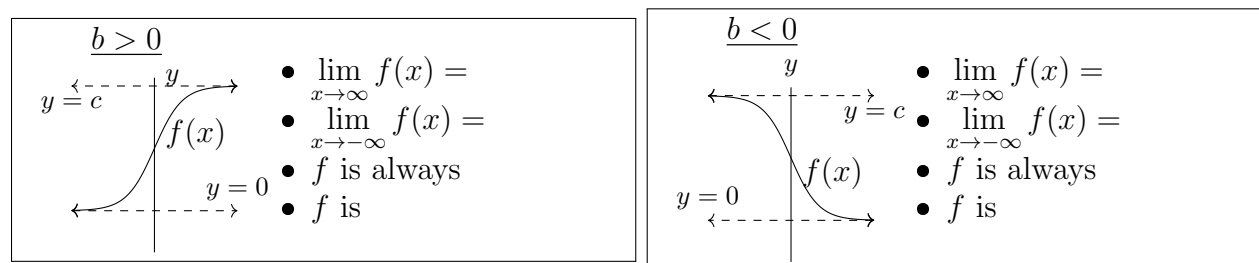
Logistic Functions

A logistic has the following descriptions:

- <u>Algebraically</u>: A logistic model has an equation of the form _____ where

  $a, b \neq 0$ are constants, and $c > 0$ is the _____.

- <u>Graphically</u>: See below; logistics have two horizontal asymptotes at _____.

Logistic Models

For logistic models, we have the following information:

$\underline{b > 0}$

- $\lim\limits_{x \to \infty} f(x) =$
- $\lim\limits_{x \to -\infty} f(x) =$
- f is always
- f is

$\underline{b < 0}$

- $\lim\limits_{x \to \infty} f(x) =$
- $\lim\limits_{x \to -\infty} f(x) =$
- f is always
- f is

Examples

Example 1.9.5.   The number of NBA players taller than a given height are listed in the table below.

Height (in inches)	**Number of Players**	**Height** (in inches)	**Number of Players**
68"	490	80"	203
70"	487	82"	86
72"	467	84"	13
74"	423	86"	2
76"	367	88"	1
78"	293		

(a) Using the scatterplot, explain why a logistic model is best for this data.

(b) Align the data so that 68" corresponds to an input of 0, and find the complete logistic model.

(c) Describe (using limit notation) the end behavior of the model as height increases.

Example 1.9.6. The narrow band residential internet access, as a percentage of total residential internet access, is given below.

Year	Narrow Band Users (in %)	Year	Narrow Band Users (in %)
2000	89.4	2008	9.6
2001	80.7	2009	7.3
2002	70.9	2010	4.3
2003	58.3	2011	3.0
2004	45.9	2012	2.5
2005	35.3	2013	1.5
2006	21.5	2014	1.0
2007	12.2		

(a) Based on the scatterplot, explain why a logistic model is best.

(b) Align the model so that 2000 corresponds to an input of 0. Find the complete logistic model for the data.

(c) Write the equations for the two asymptotes.

(d) Estimate the location of the inflection point