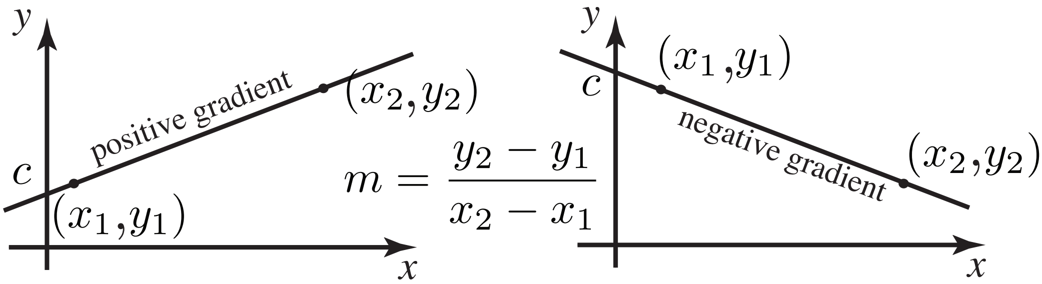
Graphs of common functions

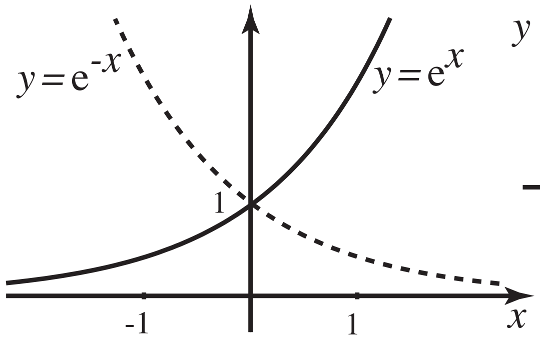
The straight line: $y = mx + c$.

m=gradient (slope), c = vertical intercept.

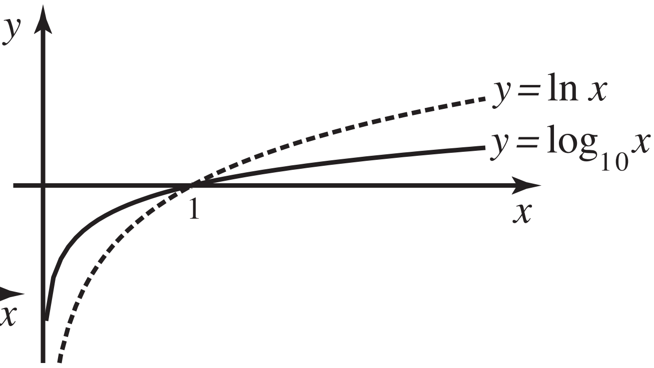


Exponential and log functions:

e ≈ 2.718 is the exponential constant.

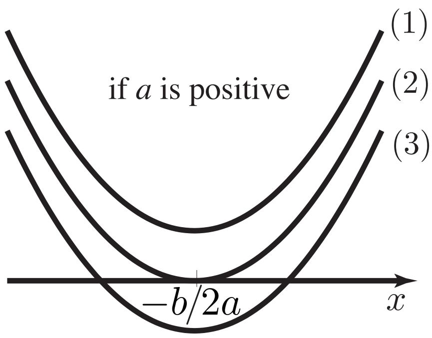


Graph of $y = e^x$ and $y = e^{-x}$
showing exponential growth/ decay

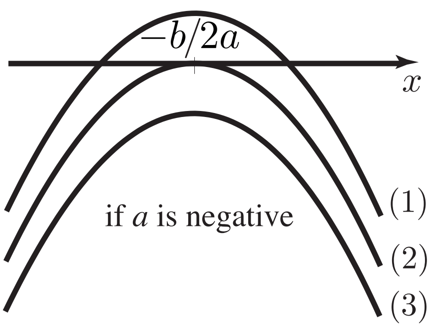


Graph of $y = \ln x$ and $y = \log_{10} x$

Quadratic functions:$y = ax^2 + bx + c$



(1) $b^2 - 4ac < 0$
(2) $b^2 - 4ac = 0$
(3) $b^2 - 4ac > 0$



(1) $b^2 - 4ac > 0$
(2) $b^2 - 4ac = 0$
(3) $b^2 - 4ac < 0$

Statistics

Population values, or **parameters**, are denoted by Greek letters. Population mean $= \mu$. Population variance $= \sigma^2$. Population standard deviation $= \sigma$. Sample values, or **estimates**, are denoted by roman letters.

The **mean** of a sample of n observations x_1, $x_2, \ldots x_n$ is

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n}$$

The sample mean $\bar{x}$ is an unbiased estimate of the population mean μ. The unbiased estimate of the **variance** of these n sample observations is $s^2 = \dfrac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$ which can be written as

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n} x_i^2 - \frac{n\bar{x}^2}{n-1}$$

The sample unbiased estimate of **standard deviation**, s, is the square root of the variance: $s = \sqrt{\dfrac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$. The standard deviation of the sample mean is called the **standard error of the mean** and is equal to $\frac{\sigma}{\sqrt{n}}$, and is often estimated by $\frac{s}{\sqrt{n}}$.