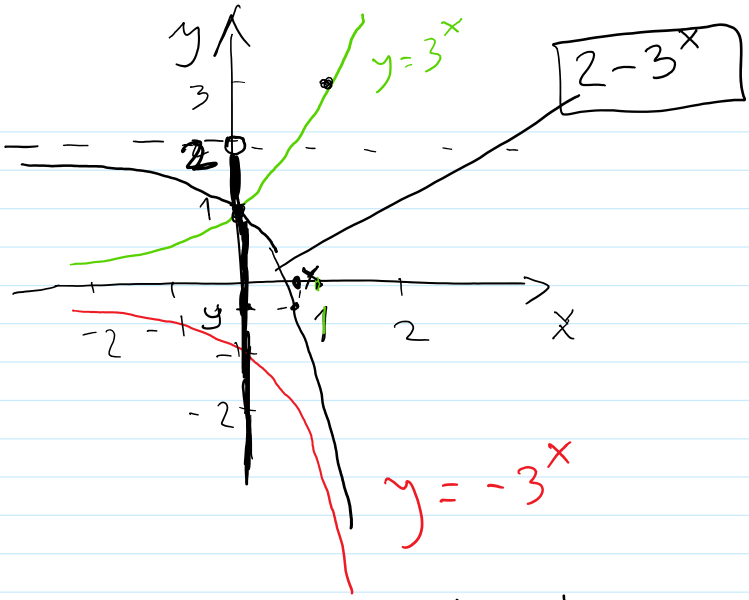
$y = 2 - 3^x$

$y = 3^x$

$y = -3^x$

$y = 2 \boxed{-3^x}$



$\text{Domain}(2-3^x) = (-\infty, \infty) = \mathbb{R}$ = all real numbers

$\text{Range}(2-3^x) = (-\infty, 2)$

2 is not included

$\{y < 2,\ y \in \mathbb{R}\}$

$\in$ = "belongs"

$\ni$

$5 \in \mathbb{R}$

$\frac{1}{2} \notin \mathbb{Z}$

$\mathbb{N} = \{1, 2, 3, \dots\}$ = natural #

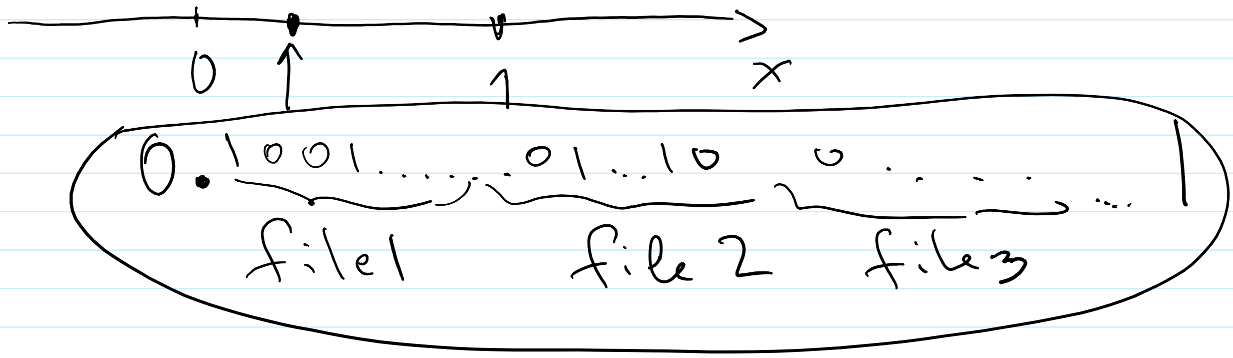
$\mathbb{Z} = \{\dots, -2, -1, 0, 1, 2, 3, \dots\}$ = integers

$\mathbb{Q} = \{\frac{p}{q},\ p \in \mathbb{Z},\ q \in \mathbb{N}\}$ = rational numbers

$\mathbb{R}$ = real numbers

$\forall$ = "for all"

$x^2 \geq 0 \quad \forall x \in \mathbb{R}$



$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$

complex numbers

$\boxed{x^2 = -1}$ $\leftarrow$ $i = \sqrt{-1}$

$$\boxed{x^2=-1} \leftarrow i=\sqrt{-1}$$

P = principal investment.

r = interest rate (say $\underbrace{1\%}_{0.01}$ per year)

$$Q = P(1+r) \quad \text{after 1 year}$$

$$Q(t) = P\underbrace{(1+r)(1+r)\dots(1+r)}_{t\text{-times}} = P(1+r)^t$$

$n=1$

- Compount monthly   t is # of years

$$Q(t) = P\left(1+\frac{r}{12}\right)^{12t}$$

$n=12$

- Compound daily

$$Q(t) = P\left(1+\frac{r}{365}\right)^{365t}$$

$n=365$

Compound every instant.

n = # of times per year interest is applied

$$Q(t) = P\left(1+\frac{r}{n}\right)^{nt}$$

$$\lim_{n\to\infty} P\left(1+\frac{r}{n}\right)^{nt} = P\left[\left(1+\frac{r}{n}\right)^{n}\right]^{t}$$

$$\lim_{n\to\infty} = \boxed{e}^{rt}$$

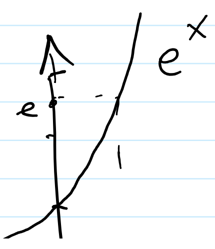
special number

$$e = 2.718281828459 0\dots$$

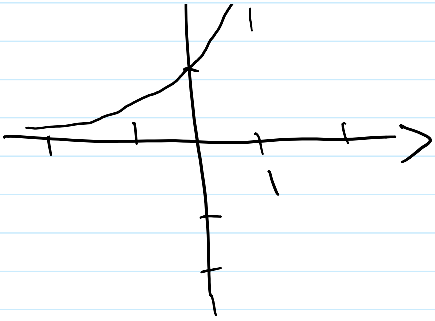
$$2<e<3$$

Remarkable limit:

$$\boxed{\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n = e}$$

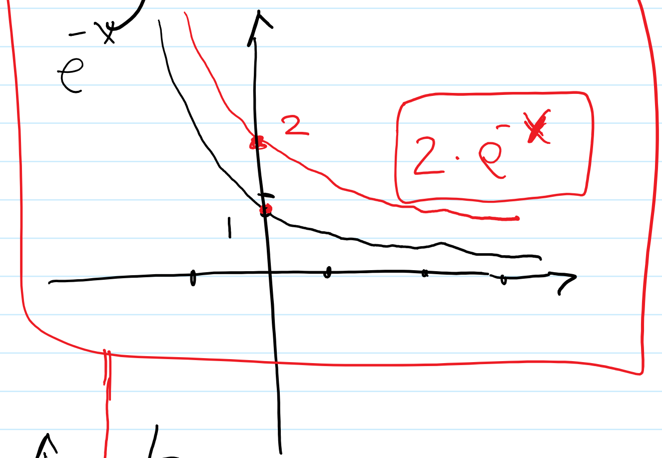


Example:



Example:

$$y = 2 \cdot e^{-x}$$



$$e^{-x} = \frac{1}{e^x} = \left(\frac{1}{e}\right)^x$$