initial pop. is 100
and it doubles every 5 years.

$(1.20)^5 = 2.48$

$t=0$
$P(0)=100$
$t=5$
$P(5)=200$

method 1 $\quad P(t)=ab^t$

$P(t)=100\,b^t$

$200=100\,b^5$

$2=b^5$

$1.149 \approx 2^{1/5}=b$

$$\boxed{P(t)=100\left(2^{1/5}\right)^t}$$

$\rightarrow P(t)=100(2)^{\frac{t}{5}}$

---

doubles every 7 years

$P(t)=100\left(2^{1/7}\right)^t$
$=100(2)^{t/7}$

$\boxed{5}$

$g(10) = 50 \qquad 50 = ab^{10}$

$g(30) = 25 \qquad 25 = ab^{30}$

$\dfrac{25}{50} = \dfrac{ab^{30}}{ab^{10}}$

$\dfrac{1}{2} = b^{20}$

$\left(\dfrac{1}{2}\right)^{1/20} = b$

$50 = a\left(\frac{1}{2}^{1/20}\right)^{10}$

$50 = a\left(\dfrac{1}{2}^{1/2}\right)$

$50 = a\,2^{-1/2}$

$50(2)^{1/2} = a$

$\boxed{g(x) = 50\sqrt{2}\left(\dfrac{1}{2}^{\frac{1}{20}}\right)^{x}}$

---

doubles over 2 years

$f(t) = a\,2^{\frac{t}{2}}$

$t = 1$
$f(1) = 7$ $\longrightarrow$ $7 = a\,2^{1/2}$

$\dfrac{7\sqrt{2}}{2} = \dfrac{7}{\sqrt{2}} = a$

$f(t) = \dfrac{7\sqrt{2}}{2}\left(\sqrt{2}\right)^{t}$

$f(t) = \dfrac{7\sqrt{2}}{2}\left(2\right)^{\frac{t}{2}}$

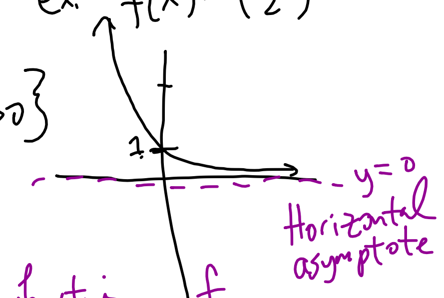
Graphing the exponential

$f(x) = a\,b^{x}$

1. domain is $\mathbb{R} = \{$the whole number line$\}$
2. range is restricted.

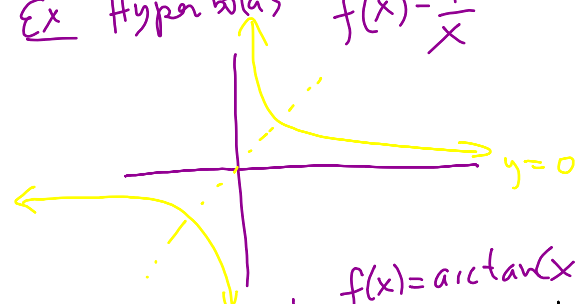
ex. $f(x) = \left(\frac{1}{2}\right)^{x}$

$R = \{y \mid y > 0\}$

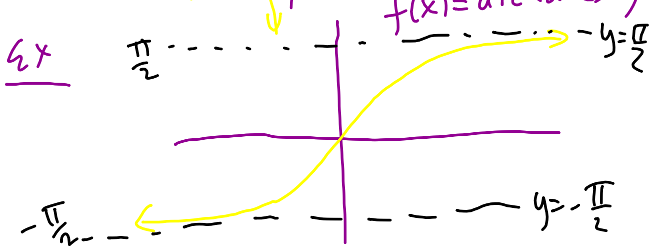


Def a function f has a Horizontal asymptote if looking as $x \to +\infty$ or $x \to -\infty$ leads to $y \to L$

Ex Hyperbola's $f(x) = \frac{1}{x}$



Ex $f(x) = \arctan(x)$



Ex $f(x) = \frac{\sin x}{x}$