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MATH 2311
Pre-Calculus I
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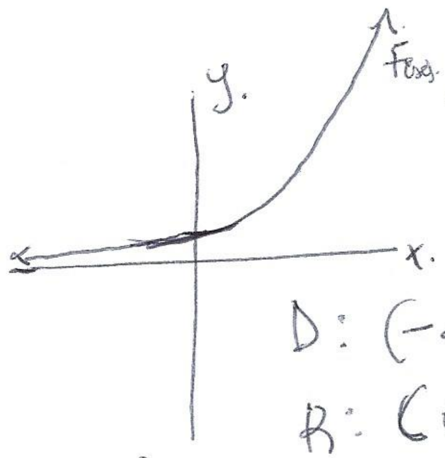
Exponential Functions:

Base: positive real number. Note: Base $\neq 1$.
exponent: Variable.

Consider: $f(x) = 2^x$.

x	y
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4



Parent graph of an exponential function:

$D: (-\infty, \infty)$

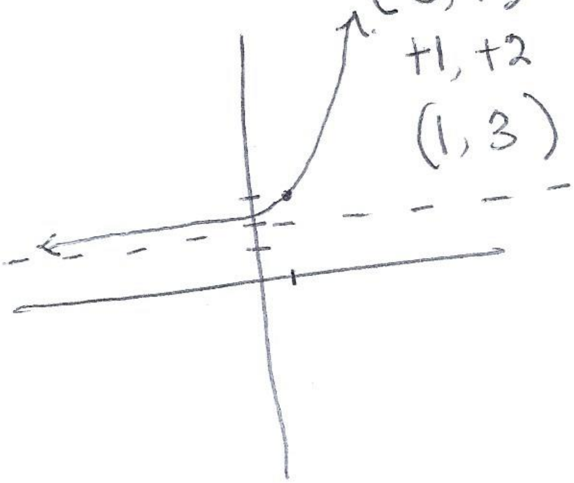
$R: (0, \infty)$.

$HA: y = 0$

graph: $f(x) = 3^{x-1} + 2$.

$x-1$ → shift to the right (+1).
$+2$ → move up (+2).

$(0, 1)$ — from parent ~~graph~~ function
$+1, +2$
$(1, 3)$



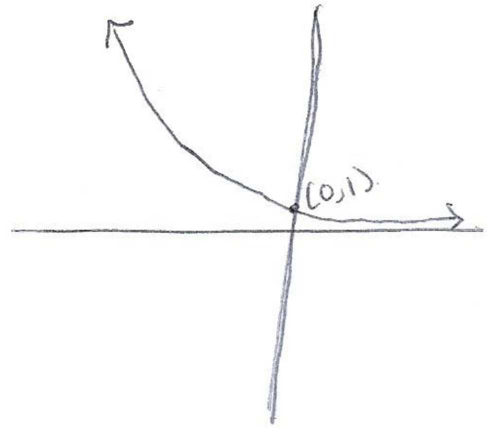
H.A $y = 2$.

$D: (-\infty, \infty)$

$R: (2, \infty)$.

$f(x) = \left(\frac{1}{2}\right)^x \Rightarrow$ Bases between zero and 1.

$\Rightarrow f(x) = \left(\frac{1}{2}\right)^x = 2^{-x}$. $\rightarrow$ reflection over y.



Natural Exponential Function.

$f(x) = e^x$

Exponential Function Applications

Growth and decay models at specific times.

\$ 4000 in account, increases 5% every 6 months.

How much money is in there at after 6 years.

growth $P(1+r)^t$

decay $P(1-r)^t$

P = original

r = rate of change decimal.

t = amount of time

$$4000(1+0.005)^{12} \simeq 6400.00$$

Continuous $\Rightarrow$ increase exponential model Pe^{rt}

eg: $P = 1\,000\,000$

$r = 17\% \longrightarrow 0.17$

$t = 6$ hours.

$\Rightarrow$ $Pe^{rt} = 1000\,000\, e^{0.17(6)}$

Decreasing Continuous exponential model

Pe^{-rt}