# Section 5.1: Exponential Functions

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8:51 AM

exponential function – in the form

$$y = a^x$$

$a$ = base (constant)
$x$ = exponent

the constant $a$ in the base has two restrictions: $\begin{cases} a > 0 \\ a \neq 1 \end{cases}$

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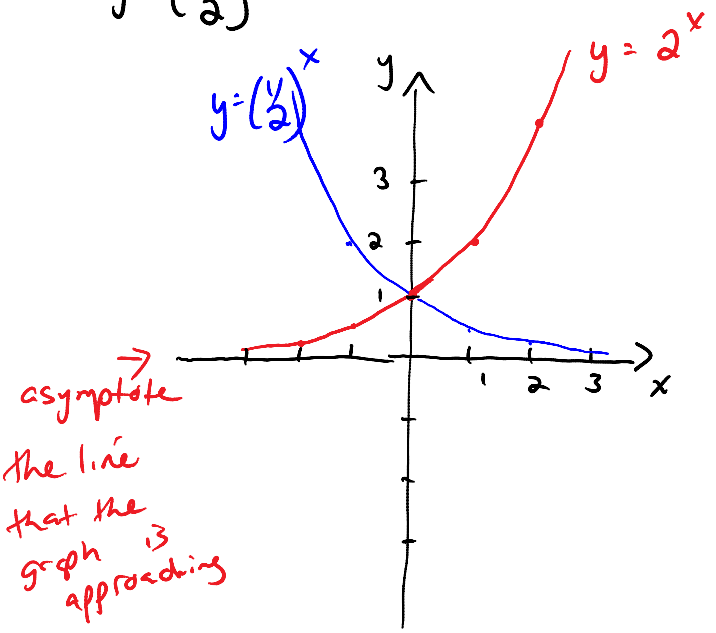
graph $y = 2^x$ and $y = \left(\frac{1}{2}\right)^x$

| $x$ | $y = 2^x$ | $y = \left(\frac{1}{2}\right)^x$ |
|---|---|---|
| $-2$ | $\frac{1}{4}$ | $4$ |
| $-1$ | $\frac{1}{2}$ | $2$ |
| $0$ | $1$ | $1$ |
| $1$ | $2$ | $\frac{1}{2}$ |
| $2$ | $4$ | $\frac{1}{4}$ |




asymptote → the line that the graph is approaching

note: $\left(\frac{1}{2}\right)^x = 2^{-x}$

features: ① graph for $y = 2^x$ climbs very

rapidly (exponential growth)

② for $y = 2^x$, as $x$ becomes more negative, the $y$ value gets smaller and smaller
→ $y$ approaches zero asymptotically

③ for both graphs, all values of $x$ are allowed (in the exponent) but the resulting $y$-values are all positive

④ the graph $y = a^x$ will always contain the point $(0,1)$