

## 3.1 Exponential Functions

- Variable is in the exponent
- Use transformations just as before

$$y = a^x$$

$$a > 1$$

$$|a| < 1$$

$$0 < a < 1$$

growth (exponential)

exponential decay

$$\text{Ex: } y = 3^x$$

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27

Asymptote:  
horizontal:  $y = 0$

$$\lim_{x \rightarrow -\infty} 3^x = \frac{1}{3^x} = 0$$

Transformations:

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

$$y = 3^x + 5 \quad \text{goes up 5}$$

$$y = 2 \cdot 3^x$$

