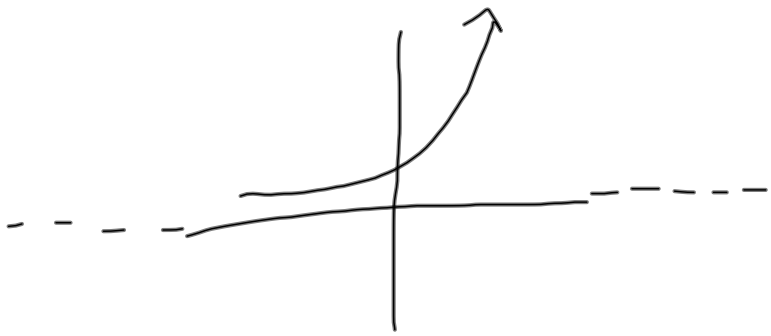
4.5 Properties of Exponential Functions

	Linear	Quadratic	Exponential
Equation	$y = x$ $y = ax + b$	$y = x^2$ $y = ax^2 + bx + c$	$x = 2^x$ $y = b^x$
Graph Sketch	degree of 1 $y = x$	parabola degree of 2 $y = x^2$	degree is variable $y = 2^x$
Domain	$x \in \mathbb{R}$	$x \in \mathbb{R}$	$x \in \mathbb{R}$
Range	$y \in \mathbb{R}$	$x \in \mathbb{R} \mid y \geq 0$	$y \in \mathbb{R} \mid y > 0$
Table of Values	$x \mid y = x$ $-2 \mid -2$ (+1) $-1 \mid -1$ (+1) $0 \mid 0$ (+1) $1 \mid 1$ (+1) $2 \mid 2$ 1st diff. are constant	$x \mid y = x^2$ $-2 \mid 4$ (−3) $-1 \mid 1$ (−1) $0 \mid 0$ (+1) $1 \mid 1$ (+3) $2 \mid 4$ 1st diff. related by addition	$x \mid 2^x$ $-2 \mid 0.25$ (×0.5) $-1 \mid 0.5$ (×0.5) $0 \mid 1$ (×2) $1 \mid 2$ (×2) $2 \mid 4$ 1st diff. related by multiplication
Intercepts	y-int (0,0) x-int (0,0)	y-int (0,0) x-int (0,0)	y-int (0,1) x-int: NONE
Asymptotes	None	None	$y = 2^x$ $y = 0$



The Exponential function $f(x) = b^x$ has the following characteristics.

- When b > 0:

domain: $\{x \in \mathbb{R}\}$ Asymptote: $y=0$
range: $\{y \in \mathbb{R} \mid y>0\}$
intercepts: y-int at (0, 1)

- If b > 1:

the greater the b, the faster the function grows

- If 0 < b < 1:

the smaller the b, the faster the decay.

HMWK: pg. 243 #1, 2
pg. 267 #9, 10