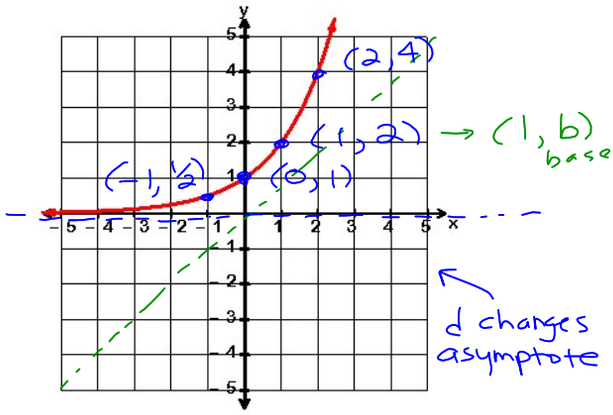
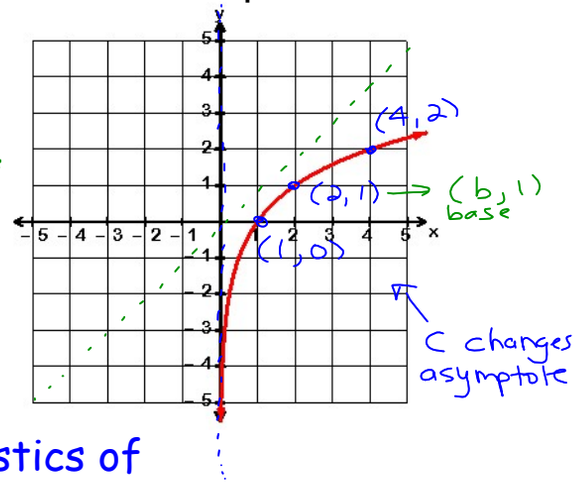
Exponential & Logarithmic Functions

Recall $y = 2^x$ ⟷ (are the same) $\log_2 y = x$

$\log_a x = y$

However a log function is the inverse of an exponential function





Characteristics of

Exponential Function

Domain: $(-\infty, \infty)$
Range: $y > 0$
y-int: 1
Asymptote: $y = 0$

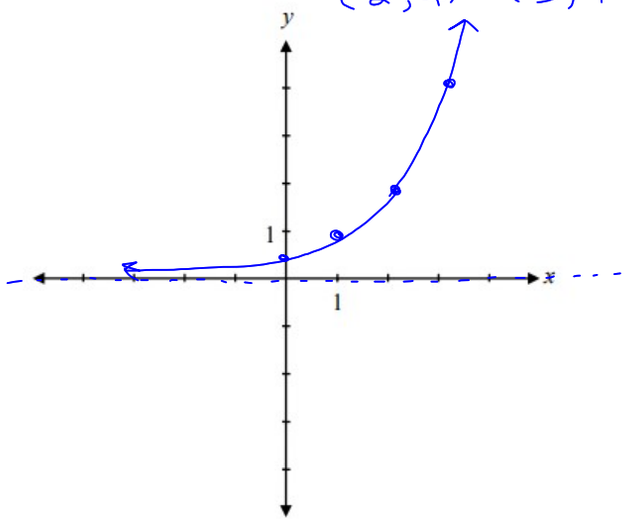
Log Function

Domain: $x > 0$
Range: $(-\infty, \infty)$
x-int: 1
Asymptote: $x = 0$

Graph:

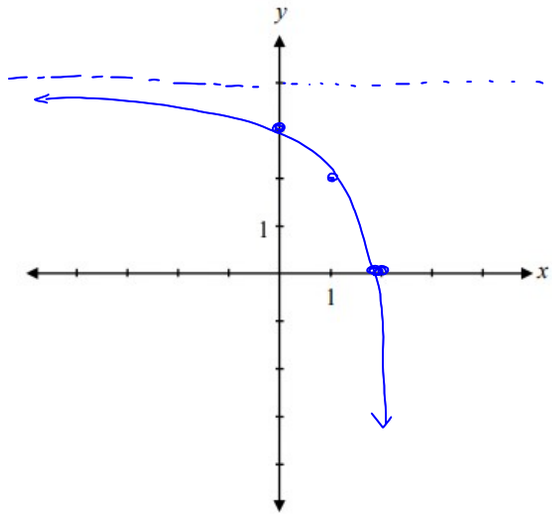
a) $y = 2^{x-1}$ (c)

(x, y)	(x+1, y)
(0, 1)	(1, 1)
(1, 2)	(2, 2)
(2, 4)	(3, 4)



b) $y = -2^x + 4$ (a, d)

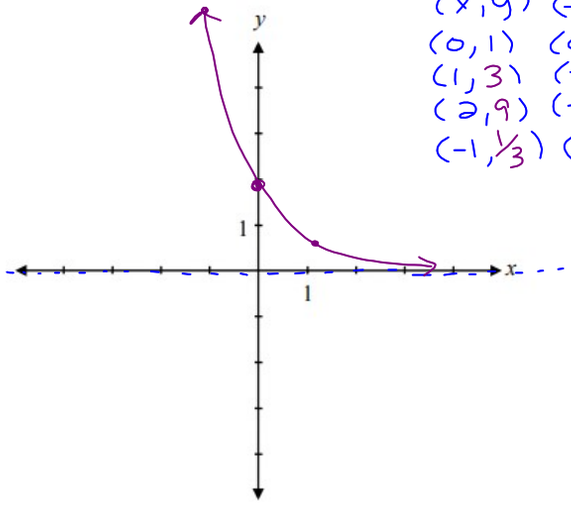
(x, y)	(x, y+4)
(0, 1)	(0, 3)
(1, 2)	(1, 2)
(2, 4)	(2, 0)



c) $y = 2\left(\frac{1}{3}\right)^x = 2(3^{-x})$

a

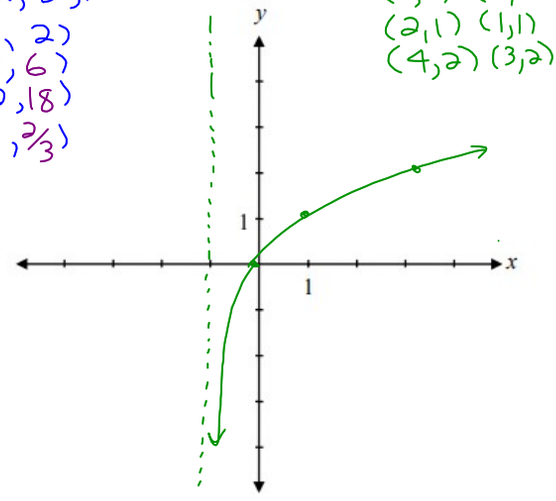
(x, y)	(−x, 2y)
(0, 1)	(0, 2)
(1, 3)	(−1, 6)
(2, 9)	(−2, 18)
(−1, 1/3)	(1, 2/3)



d) $f(x) = \log_2(x + 1)$

c

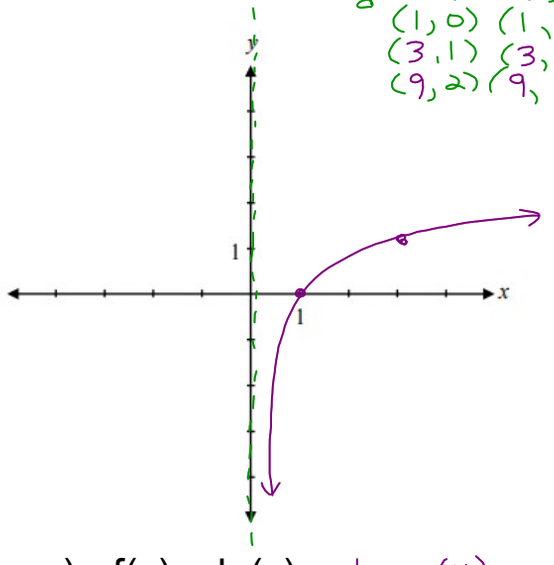
(x, y)	(x−1, y)
(1, 0)	(0, 0)
(2, 1)	(1, 1)
(4, 2)	(3, 2)



e) $f(x) = \log_3(x) + 2$

d

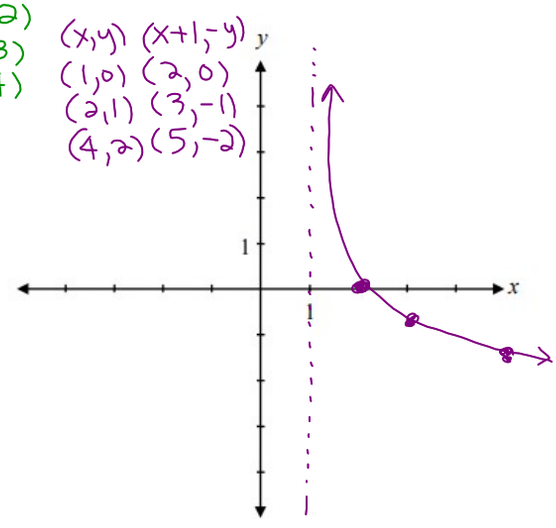
(x, y)	(x, y+2)
(1, 0)	(1, 2)
(3, 1)	(3, 3)
(9, 2)	(9, 4)



f) $f(x) = -\log_2(x - 1)$

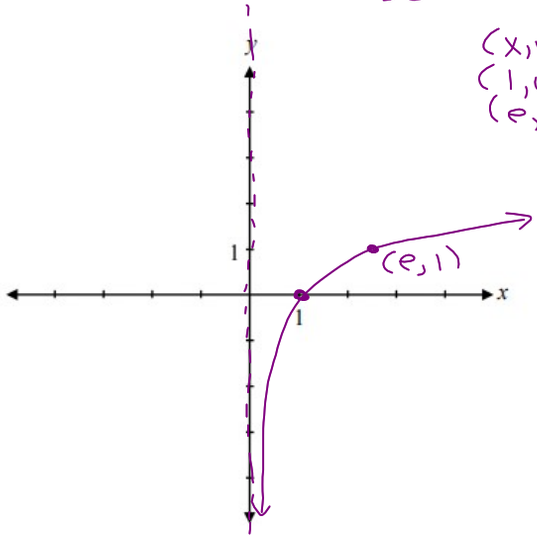
a c

(x, y)	(x+1, −y)
(1, 0)	(2, 0)
(2, 1)	(3, −1)
(4, 2)	(5, −2)



g) $f(x) = \ln(x) = \log_e(x)$

(x, y)
(1, 0)
(e, 1)



h) $f(x) = \ln(1 - x)$

$\ln(-x+1) = \ln(-(x-1))$

b c

(x, y)	(−x+1, y)
(1, 0)	(0, 0)
(e, 1)	(−e+1, 1)

−1.7