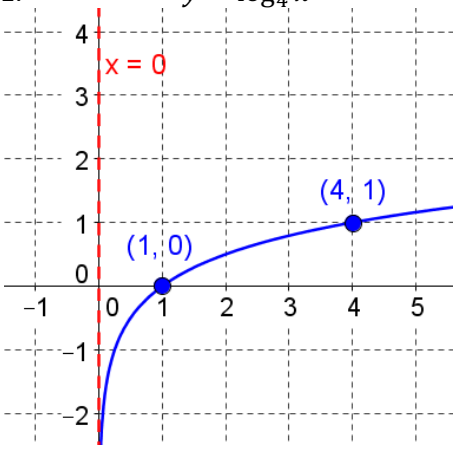
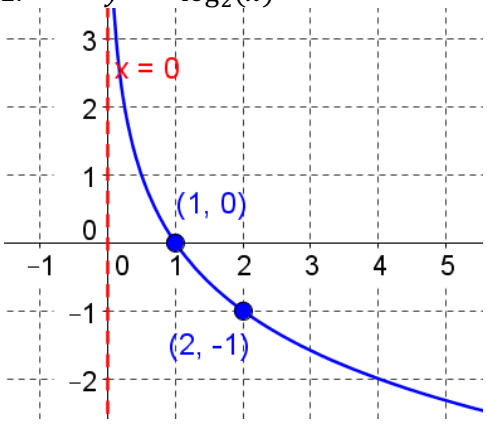
SM3 7.3 Log Graphs

Graph the following. Include the border and two points on the function.

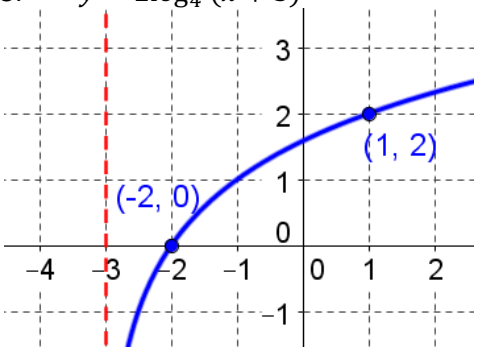
1. $y = \log_4 x$



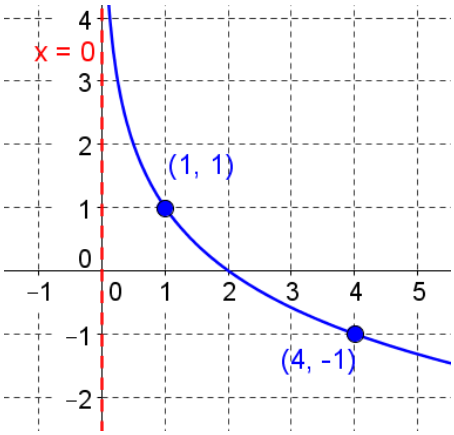
2. $y = -\log_2(x)$



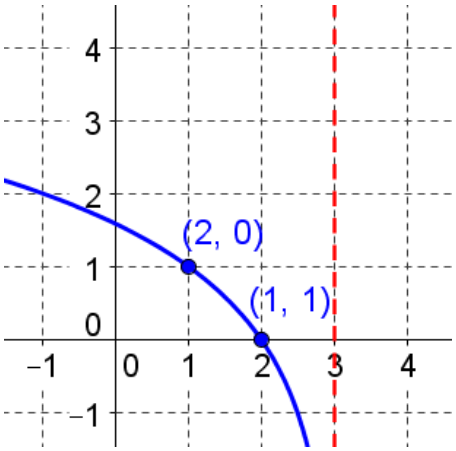
3. $y = 2\log_4(x + 3)$



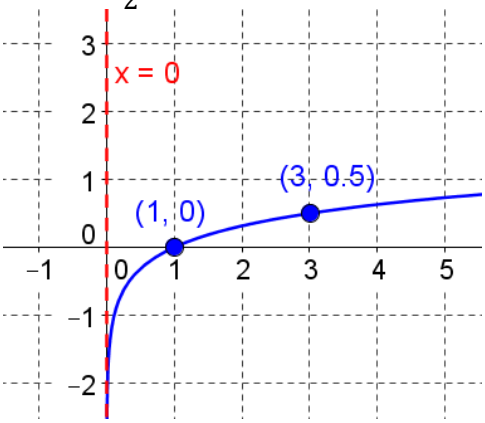
4. $y = -2\log_4(x) + 1$



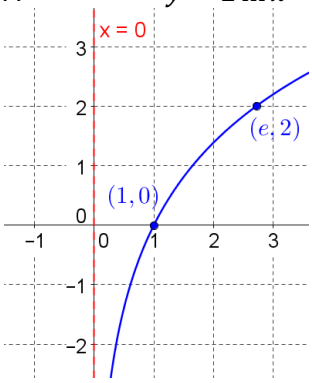
5. $y = \log_2(3 - x)$



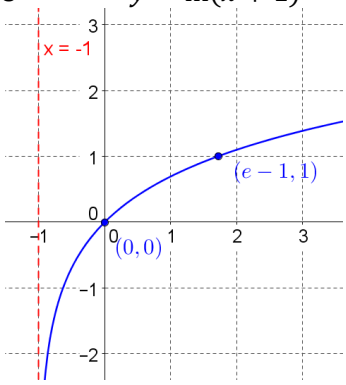
6. $y = \frac{1}{2}\log_3(x)$



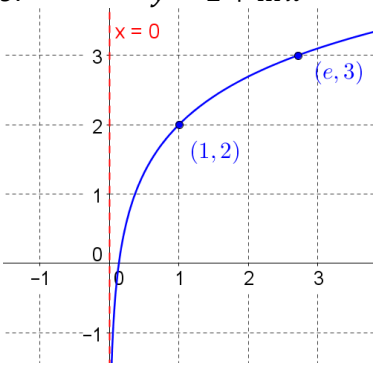
7. $y = 2\ln x$



8 $y = \ln(x+1)$



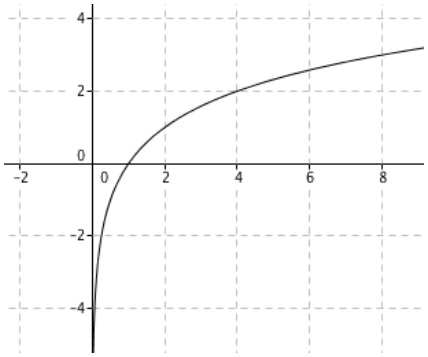
9. $y = 2 + \ln x$



For the problems 7-16 find the listed properties. You may graph the function if you find that it helps you to see the properties:

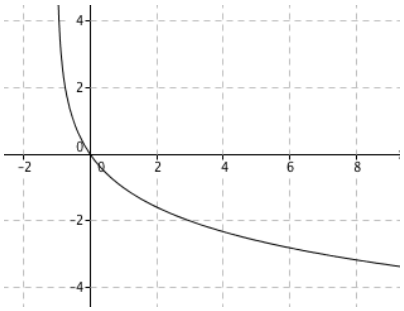
a. domain
b. range
c. intervals of increase and decrease
d. zeroes
e. y-intercept
f. end behavior

10.



$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= (0, \infty)$, Dec $= \emptyset$
Zeroes: (1,0)
y-int: $\emptyset$
$\lim_{x \to \infty} y = \infty$

11.



$D = (-1, \infty)$
$R = \mathbb{R}$
Inc $= \emptyset$, Dec $= (-1, \infty)$
Zeroes: (0,0)
y-int: (0,0)
$\lim_{x \to \infty} y = -\infty$

12. $y = \log_2 x$

$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= \mathbb{R}^+$, Dec $= \emptyset$
Zeroes: $(1,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = \infty$

13. $y = -\log_3 x$

$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= \emptyset$, Dec $= \mathbb{R}^+$
Zeroes: $(1,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = -\infty$

14. $y = 2\log x$

$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= \mathbb{R}^+$, Dec $= \emptyset$
Zeroes: $(1,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = \infty$

15. $y = 3ln(x) + 2$

$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= \mathbb{R}^+$, Dec $= \emptyset$
Zeroes: in $(0,1)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = \infty$

16. $y = -ln(x - 2)$

$D = (2, \infty)$
$R = \mathbb{R}$
Inc $= \emptyset$, Dec $= (2, \infty)$
Zeroes: $(3,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = -\infty$

17. $y = \ln(x - 1)$

$D = (1, \infty)$
$R = \mathbb{R}$
Inc $= (1, \infty)$, Dec $= \emptyset$
Zeroes: $(2,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = \infty$

18. $y = a\log_b x$, a and b are natural numbers greater than 1

$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= \mathbb{R}^+$, Dec $= \emptyset$
Zeroes: $(1,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = \infty$

19. $y = -a \log_b x$, a and b are natural numbers greater than 1

$D = (0, \infty)$
$R = \mathbb{R}$
Inc $= \emptyset$, Dec $= \mathbb{R}^+$
Zeroes: $(1,0)$
y-int: $\emptyset$
$\lim_{x \to \infty} y = -\infty$

Find the average rate of change on the given interval.

20. $y = \log_2 x$ on $[4,8]$

$f(4) = 2, f(8) = 3$

$m = \dfrac{y_2 - y_1}{x_2 - x_1} =$

$m = \dfrac{(3) - (2)}{8 - 4} = \dfrac{1}{4}$

$m = \dfrac{1}{4}$

21. $y = -\log_3 x$ on $\left[\frac{1}{3}, 3\right]$

$f\left(\dfrac{1}{3}\right) = 1, f(3) = -1$

$m = \dfrac{y_2 - y_1}{x_2 - x_1} =$

$m = \dfrac{(-1) - (1)}{3 - \frac{1}{3}} = \dfrac{-2}{8/3} =$

$m = -\dfrac{6}{8} = -\dfrac{3}{4}$

$m = -\dfrac{3}{4}$

22. $y = \ln x^2$ on $(2,6)$

$(2, \ln 4), (6, \ln 36)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$m = \dfrac{(\ln 36) - (\ln 4)}{(6) - (2)}$

$m = \dfrac{\ln 9}{4}$