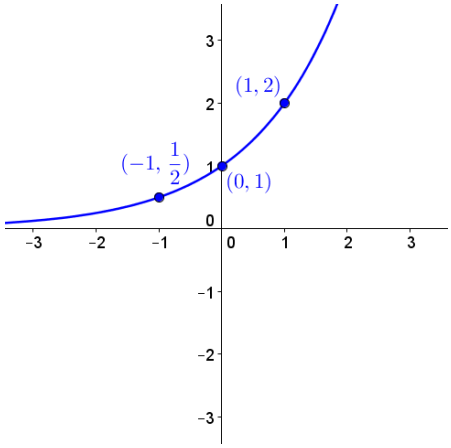
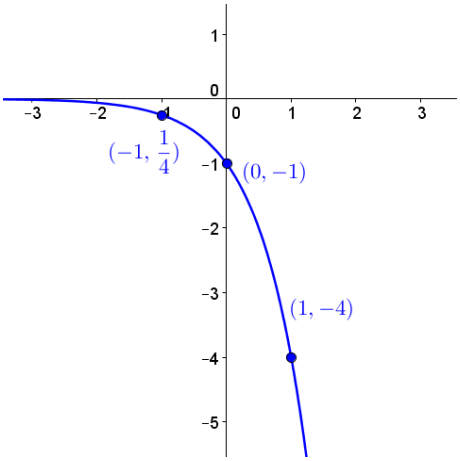
SM37.1 Exponential Graphs

Graph the following. Label the central point as well as two points on either side of it.

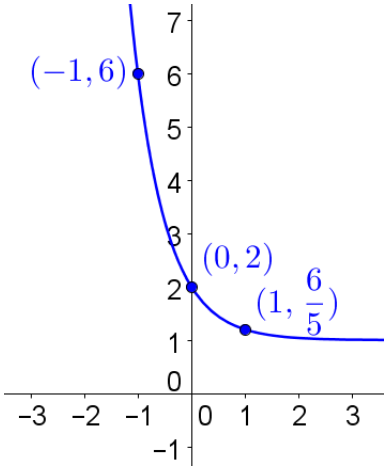
1. $y = 2^x$



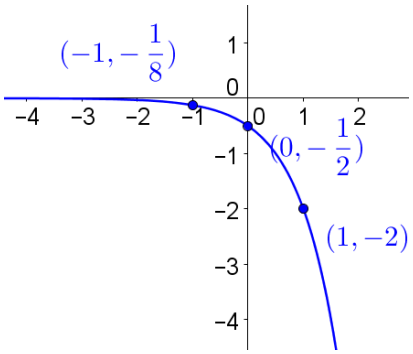
2. $y = -4^x$



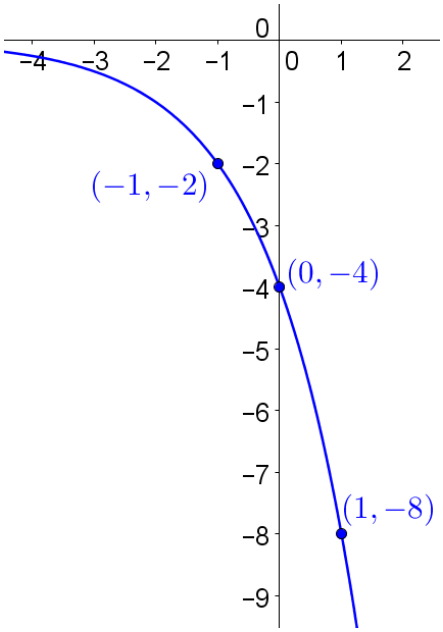
3. $y = 5^{-x} + 1$



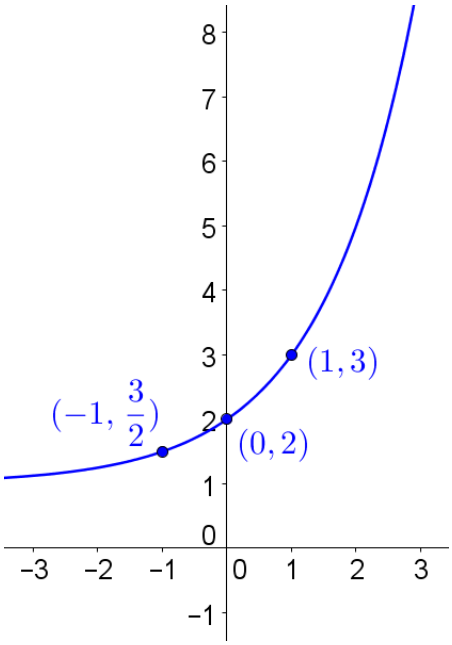
4. $y = -2(4)^{x-1}$



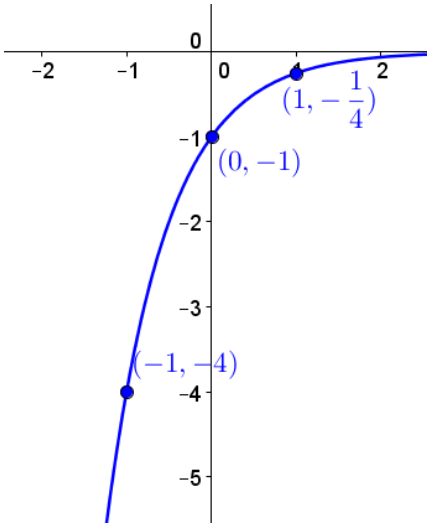
5. $y = -(2)^{x+2}$



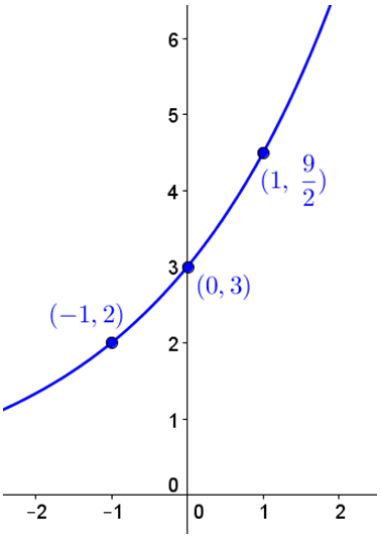
6. $y = 2^x + 1$



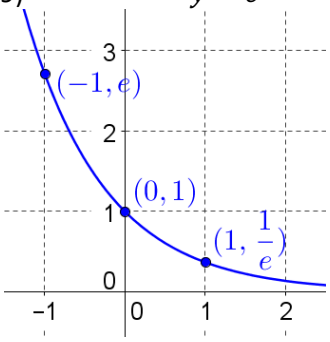
7. $y = -\left(\frac{1}{4}\right)^x$



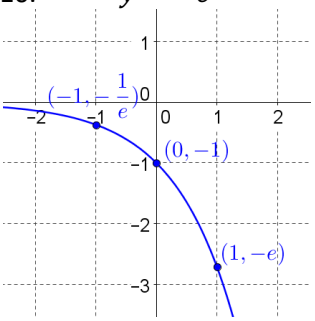
8. $y = 3\left(\frac{3}{2}\right)^x$



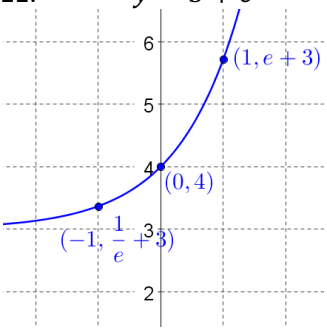
9) $y = e^{-x}$



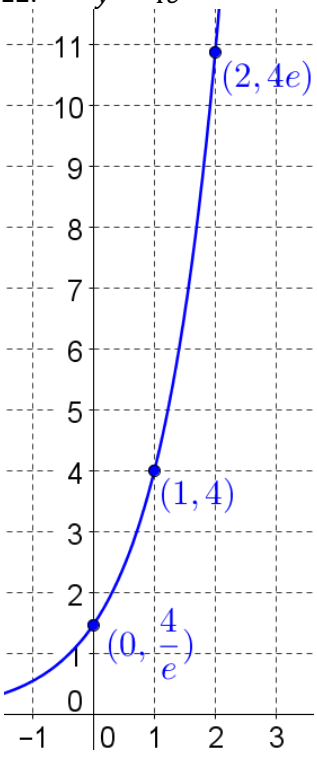
10. $y = -e^x$



11. $y = 3 + e^x$



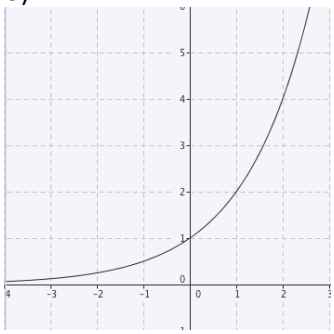
12. $y = 4e^{x-1}$



For problems 9-18 find the listed properties. You may graph the function if you find that it helps you to see the properties:

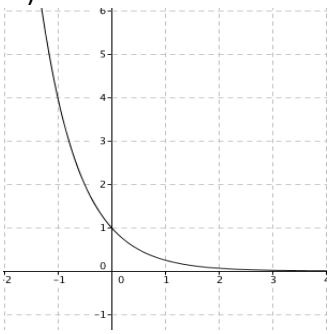
a. domain *b. range* *c. intervals of increase and decrease*
d. y-intercept *e. end behavior*

13)



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

14)



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

15. $y = 3^x$

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

16. $y = 3^{-x}$

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

17. $y = -3^x$

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

18. $y = -3^{-x}$

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

19. $y = -2(3^x)$

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

20. $y = 2(3^x)$

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

21. $y = a(b^x)$, a and b are natural numbers greater than 1

$D = \mathbb{R}$
$R = (0, \infty)$
Inc $= \mathbb{R}$, Dec $= \emptyset$
y-int: $(0, a)$

$\lim_{x\to-\infty} y = 0, \lim_{x\to\infty} y = \infty$

22. $y = -a(b^x)$, a and b are natural numbers greater than 1

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

Find the average rate of change on the given interval.

23. $y = 5(2^x)$, $[3,5]$

24. $y = e^{(2x)}$, $(0,3)$

$f(3) = 40, f(5) = 160$ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{(160) - (40)}{5 - 3} = \frac{120}{2}$ $m = 60$	$(0,1), (3, e^6)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{(e^6) - (1)}{(3) - (0)}$ $m = \frac{e^6 - 1}{3}$