

S 4.1 I #s 9-20, 21, 24, 27, 30, 33, 34, 37, 38,
39, 40, 41, 42, 47, 50, 51, 55

#s 9-20 Evaluate each exponential expression without a calculator.

(9) $3^3 = 27$ (10) $2^5 = 32$ (11) $-2^0 = -1$

(12) $-4^0 = -1$ (13) $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$ (14) $3^{-2} = \frac{1}{9}$

(15) $(\frac{1}{2})^{-4} = 2^4 = 16$ (16) $(\frac{1}{3})^{-2} = 3^2 = 9$ (17) $8^{\frac{2}{3}} = (8^{\frac{1}{3}})^2 = 2^2 = 4$

(18) $9^{\frac{3}{2}} = (9^{\frac{1}{2}})^3 = 3^3 = 27$ (19) $-9^{-\frac{3}{2}} = -(9^{-\frac{1}{2}})^3 = -(\frac{1}{3})^3 = -\frac{1}{27}$

(20) $-4^{-\frac{3}{2}} = -(4^{\frac{1}{2}})^{-3} = -2^{-3} = -\frac{1}{8}$

#s 21-32 Let $f(x) = 3^x$, $g(x) = 2^{1-x}$, $h(x) = (\frac{1}{4})^x$.

Find the following values.

(21) $f(2) = 3^2 = 9$ (24) $f(-3) = 3^{-3} = \frac{1}{27}$

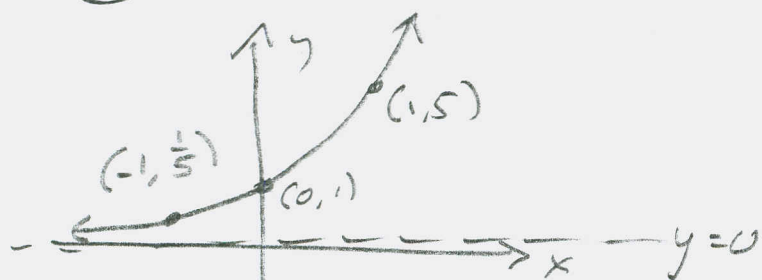
(27) $g(-2) = 2^{1-(-2)} = 2^3 = 8$

(30) $h(-2) = (\frac{1}{4})^{-2} = 4^2 = 16$

#s 33-38 Sketch the graph using transformations. State Domain, Range, & increasing/decreasing.

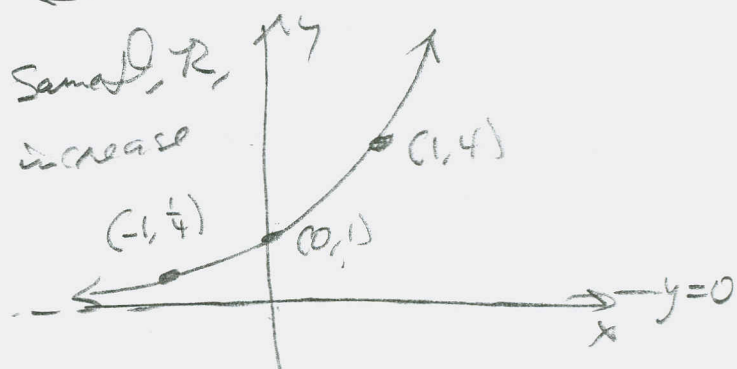
121 $\$4, 1$ I #s 33, 34, 37, 38, 39, 40, 41, 42, 47, 50, 51, 58

(33) $f(x) = 5^x$



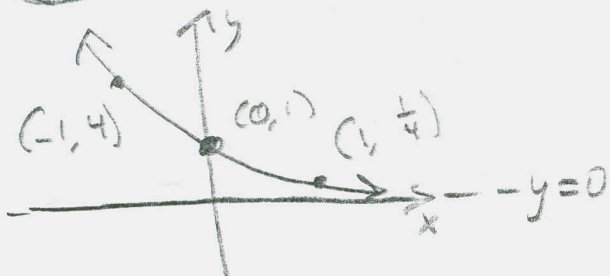
Increasing on $(-\infty, \infty)$
 $D = R = (-\infty, \infty)$
 $R = (0, \infty)$

(34) $f(x) = 4^x$



Same $D, R,$
 increase

(37) $f(x) = (\frac{1}{4})^x$

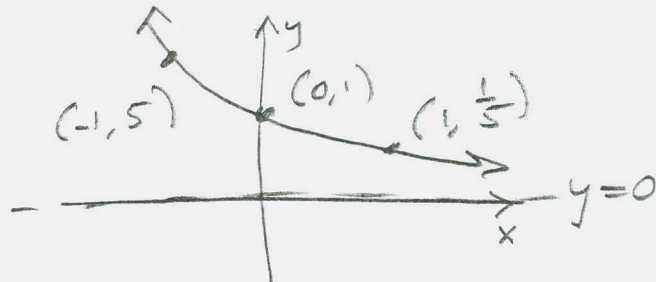


$D = (-\infty, \infty)$

$R = (0, \infty)$

Decreasing for all $x \in (-\infty, \infty)$

(38) $f(x) = (.2)^x = (\frac{1}{5})^x$



← Same

#s 39-46 Use a graph or a table to find the limit

(39) $\lim_{x \rightarrow \infty} 3^x = \infty$

(40) $\lim_{x \rightarrow -\infty} 3^x = 0$

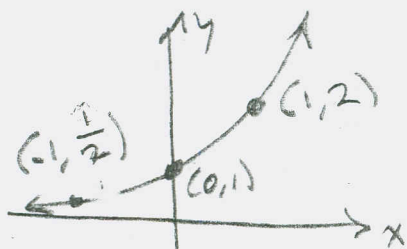
(41) $\lim_{x \rightarrow +\infty} 5^{-x} = 0$

(42) $\lim_{x \rightarrow -\infty} 5^{-x} = +\infty$

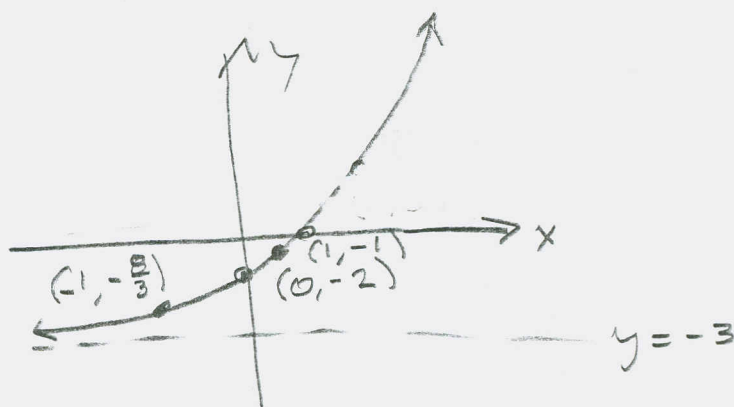
#s 47-58 Use transformations to graph each function. Want to see $D, R,$ asymptote, and increasing/decreasing.

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(47) $g(x) = 2^x - 3$



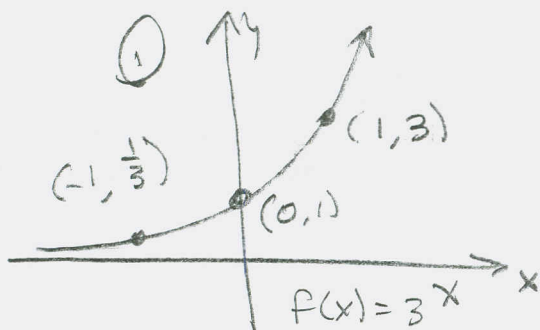
$f(x) = 2^x$



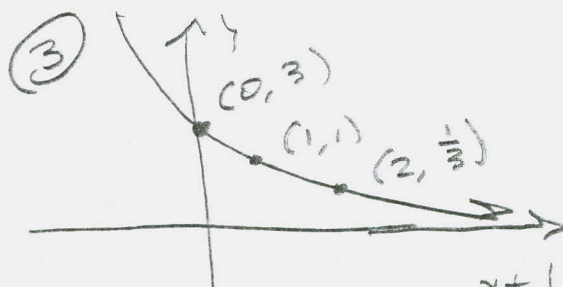
$D = (-\infty, \infty)$
 $R = (-3, \infty)$ Increasing

(50) $g(x) = 3^{1-x} - 4 = 3^{-x+1} - 4$

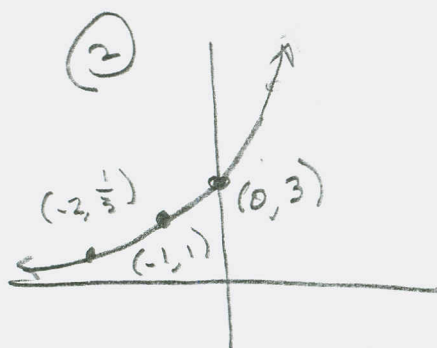
Method: $3^x \rightarrow 3^{x+1} \rightarrow 3^{-x+1} \rightarrow 3^{-x+1} - 4$



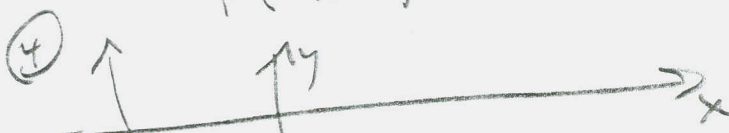
$f(x) = 3^x$



$f(-x+1) = 3^{-x+1}$



$f(x+1) = 3^{x+1}$



$D = (-\infty, \infty)$

$R = (-4, \infty)$

Decreasing

$g(x) = f(-x+1) - 4$

$= 3^{-x+1} - 4$

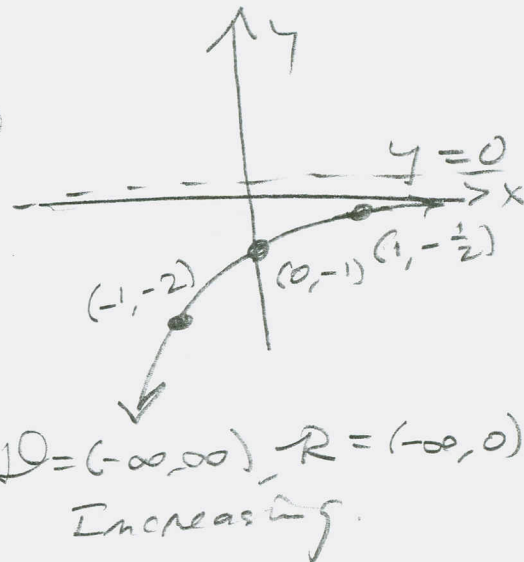
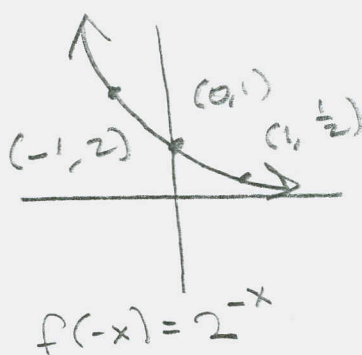
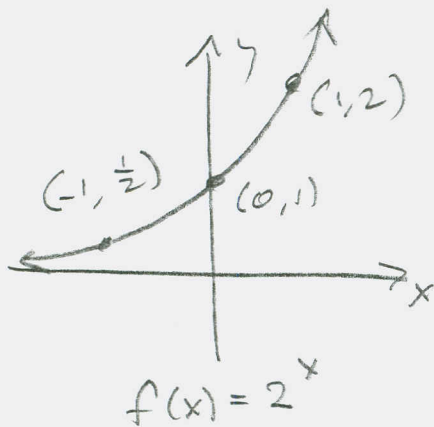
121 § 4.1 #5, 55

(51)

$y = -2^{-x}$

$2^x \rightarrow 2^{-x} \rightarrow -2^{-x}$

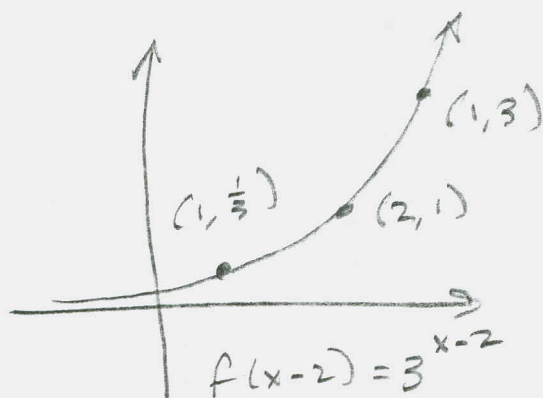
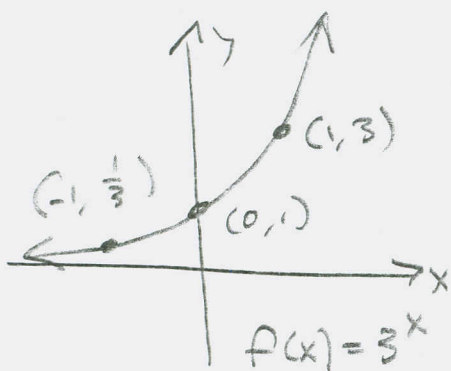
$f(x) \rightarrow f(-x) \rightarrow -f(-x)$



(55)

$g(x) = 0.5 \cdot 3^{x-2}$

$3^x \rightarrow 3^{x-2} \rightarrow .5 \cdot 3^{x-2}$
 $f(x) \quad f(x-2) \quad .5 f(x-2)$



$D = (-\infty, \infty)$

$R = (0, \infty)$

Increasing.

