

1. x

x	10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}	$10^{1/2}$
$\log x$	3	2	1	0	-1	-2	-3	$\frac{1}{2}$

2. $9, \log_9 9 = 1, \log_9 1 = 0, \log_9 \frac{1}{9} = -1,$

$\log_9 81 = 2, \log_9 3 = \frac{1}{2}$

3. $5^3 = 125 \iff \log_5 125 = 3$

$\log_5 25 = 2 \iff 5^2 = 25$

4. (a) III (b) II

(c) I (d) IV

7. $\log_8 8 = 1$

$\log_8 64 = 2$

$\log_8 4 = \frac{2}{3}$

$\log_8 512 = 3$

$\log_8 \frac{1}{8} = -1$

$\log_8 \frac{1}{64} = -2$

$8^1 = 8$

$8^2 = 64$

$8^{2/3} = 4$

$8^3 = 512$

$8^{-1} = \frac{1}{8}$

$8^{-2} = \frac{1}{64}$

9. (a) $3^4 = 81$

(b) $3^0 = 1$

15. (a) $e^{3y} = 5$

(b) $e^{-1} = t + 1$

$$\underline{19.} \quad (a) \quad \log_8 \frac{1}{8} = -1$$

$$(b) \quad \log_2 \frac{1}{8} = -3$$

$$\underline{23.} \quad (a) \quad \ln 2 = x$$

$$(b) \quad \ln y = 3$$

$$\underline{25.} \quad (a) \quad \log_2 2 = 1$$

$$\text{BECAUSE } 2^1 = 2$$

$$(b) \quad \log_5 1 = 0$$

$$\text{BECAUSE } 5^0 = 1$$

$$(c) \quad \log_6 6^5 = 5$$

$$\text{BECAUSE ... WELL ... } 6^5 = 6^5 !$$

$$\underline{29.} \quad (a) \quad \log_3 \left(\frac{1}{27}\right) = -3$$

$$(b) \quad \log_{10} \sqrt{10} = \log_{10} 10^{1/2} = \frac{1}{2}$$

$$(c) \quad \log_5 0.2 = \log_5 \frac{1}{5} = -1$$

$$\underline{31.} \quad (a) \quad 3^{\log_3 5} = 5$$

$$(b) \quad 5^{\log_5 27} = 27$$

$$(c) \quad e^{\ln 10} = 10$$

$$\underline{35.} \quad \log_4 x = 3 \Leftrightarrow 4^3 = x$$

$$\boxed{x = 64}$$

$$\log_{10} 0.01 = x \Leftrightarrow 10^x = 0.01 = \frac{1}{100} = 10^{-2}$$

$$\boxed{x = -2}$$

37. (a) $\ln x = 3 \Leftrightarrow \boxed{e^3 = x}$

(b) $\ln e^2 = x \Leftrightarrow e^x = e^2 \rightarrow \boxed{x = 2}$

42. (a) $\log_x 1000 = 3 \Leftrightarrow x^3 = 1000$

$$x = \sqrt[3]{1000} = \underline{\underline{10}}$$

(b) $\log_x 25 = 2 \Leftrightarrow x^2 = 25$

$$x = \pm 5 \rightarrow \boxed{x = 5}$$

53. $\boxed{y = \log_5 x}$

BECAUSE $(5, 1)$ IS ON THE GRAPH

AND $1 = \log_5 5$ (i.e. $5^1 = 5$)

54. $\boxed{y = \log_2 x}$

BECAUSE $(\frac{1}{2}, -1)$ " "

" $-1 = \log_2 \frac{1}{2}$ (i.e. $2^{-1} = \frac{1}{2}$)

55. $\boxed{y = \log_9 x}$

" $(3, \frac{1}{2})$ " "

" $\frac{1}{2} = \log_9 3$ (i.e. $9^{\frac{1}{2}} = 3$)

56. $\boxed{y = \log_3 x}$

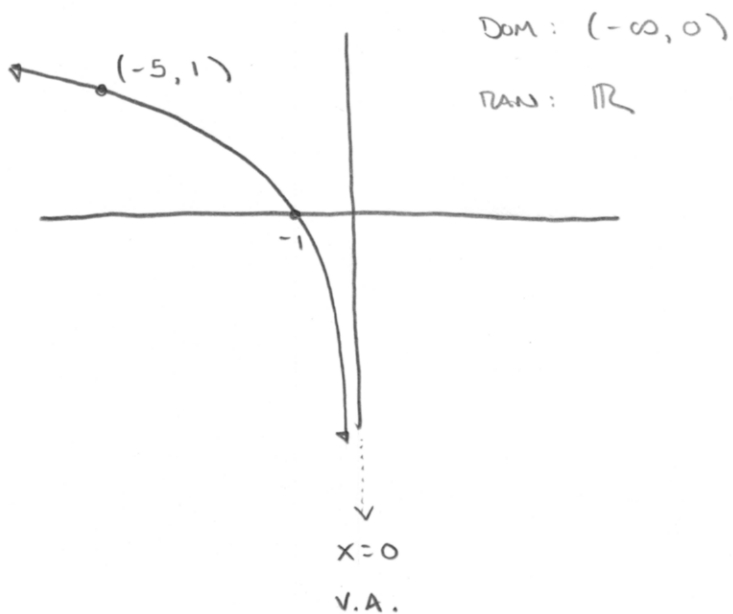
" $(9, 2)$ " "

" $2 = \log_3 9$ (i.e. $3^2 = 9$)

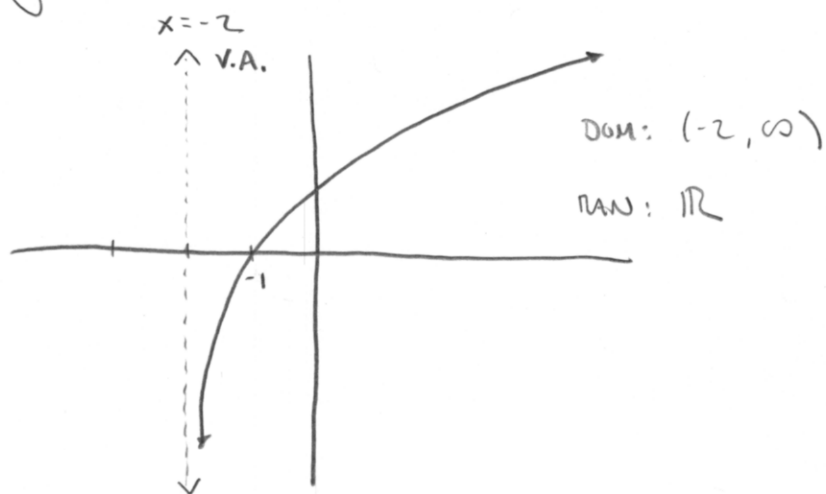
57. I

58. II

61. $g(x) = \log_5(-x)$



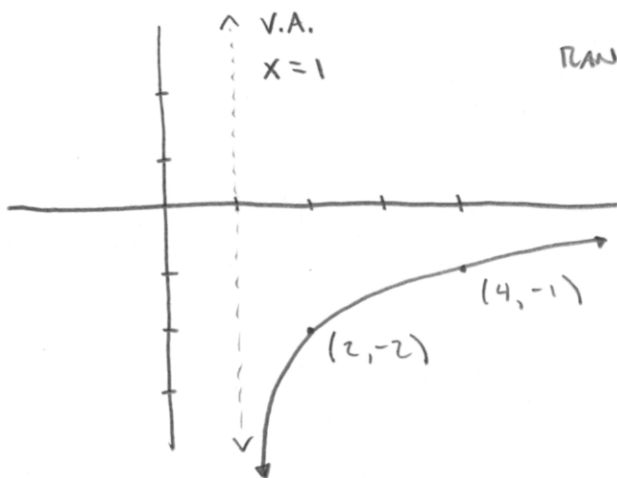
64. $g(x) = \ln(x+2)$



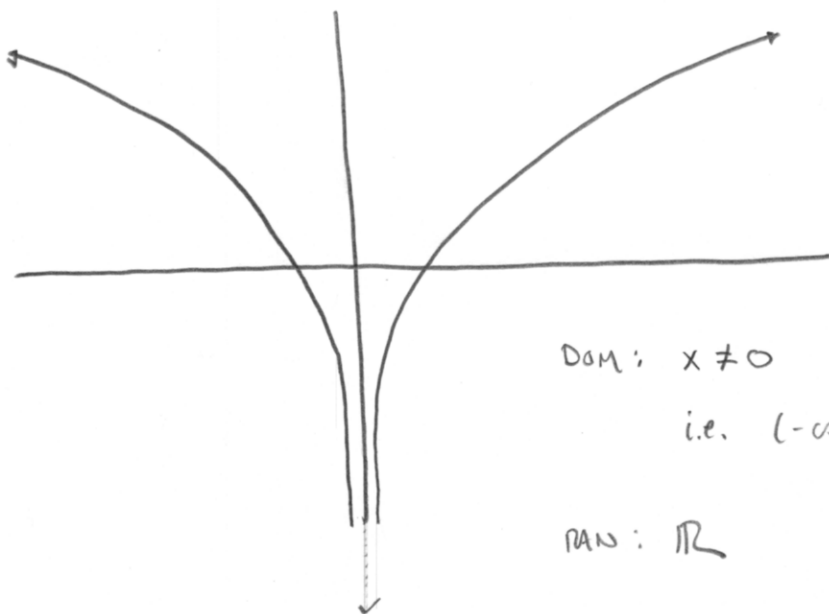
69. $y = \text{Log}_3(x-1) - 2$

DOM: $(1, \infty)$

RAN: \mathbb{R}



72. $y = \ln|x| = \begin{cases} \ln x & \text{if } x > 0 \\ \ln(-x) & \text{if } x < 0 \end{cases}$



DOM: $x \neq 0$

i.e. $(-\infty, 0) \cup (0, \infty)$

RAN: \mathbb{R}

V.A.
 $x=0$