EXPONENTS and LOGARITHMS **A**

1. In a population of moths, 78 moths increase to 1000 moths in 40 weeks. What is the doubling time for this population of moths? Solve algebraically using logarithms. Answer accurate to 2 decimal places.

2. Solve algebraically: $\log 2 - \log(x-1) = \log(x+1) - \log(x+17)$

3. A radioactive substance has a half-life of 17 d. How long will it take for 300 g of this substance to decay to 95 g? Solve algebraically using logarithms. Answer accurate to 2 decimal places.

4. Solve algebraically: $2\log_3(x+4) - \log_3(-x) = 2$

$A = A_0(1+\frac{R}{t})^{t\cdot 1}$ ✓ $n=1$

$A = A_0(1+\frac{R}{n})^{nt}$

$A = A_0(x)^{t/T}$ years

1).

$1000 = 78(2)^{40/T}$

$\frac{1000}{78} = \frac{78(2)^{40/T}}{78}$

$12.8205 = 2^{40/T}$

$\log 12.8205 = 40/T \log 2$

$\frac{\log 12.8205}{\log 2} = \frac{40}{T}$

$\frac{3.6803}{1} = \frac{40}{T}$

$3.6803T = 40$

$T = \frac{40}{3.6803}$

$T = 10.868 \Rightarrow 10.87$

EXPONENTS and LOGARITHMS **A**

1. $n = 10.87$ weeks

2. $x = 7$

3. $d = 28.20$ days

4. $x = -1$

2. Solve algebraically: $\log 2 - \log(x-1) = \log(x+1) - \log(x+17)$

$\log \frac{2}{x-1} = \log \frac{(x+1)}{(x+17)}$

$\frac{2}{x-1} = \frac{x+1}{x+17}$

$2(x+17) = (x+1)(x-1)$

$2x + 34 = x^2 - x + x - 1$

$2x + 34 = x^2 - 1$

$x^2 - 1 - 2x - 34 = 0$

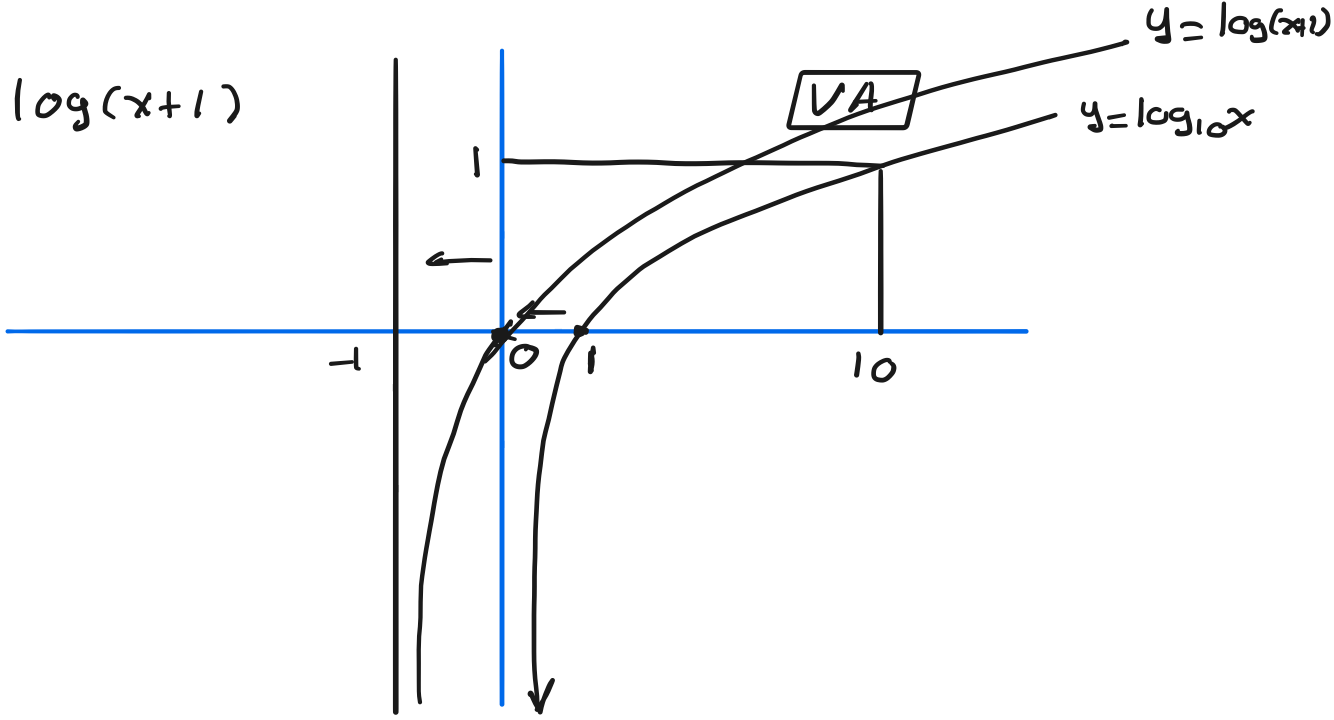
$x^2 - 2x - 35 = 0$

$(x-7)(x+5) = 0$

$x = 7, \quad x = -5$ — Reject

Answer

$y = \log(x+1)$



x	y
9	1

A) $y = 2^{-x+1}$

$x \to \infty$
$x \to -\infty$

$x \to -\infty$
$y \to 2^{\infty}$

$-(0)+1$
2
2^1
2
$-(-1)+1$
2^2

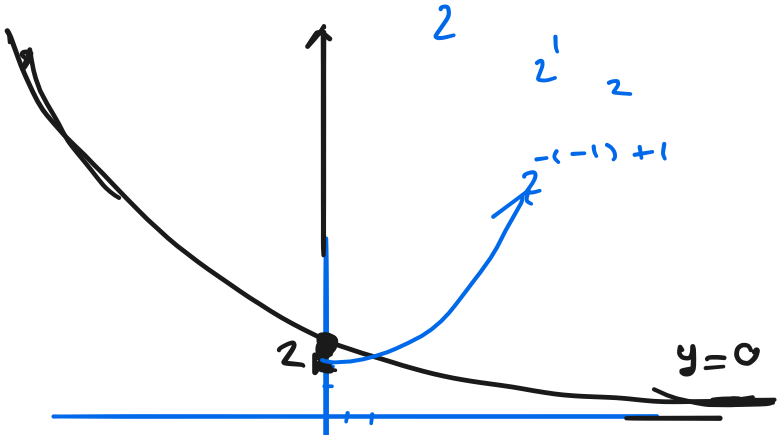
B) $y = \left(\frac{1}{3}\right)^x$

$x \to \infty$
$x \to -\infty$

C) $y = \log_3 x$

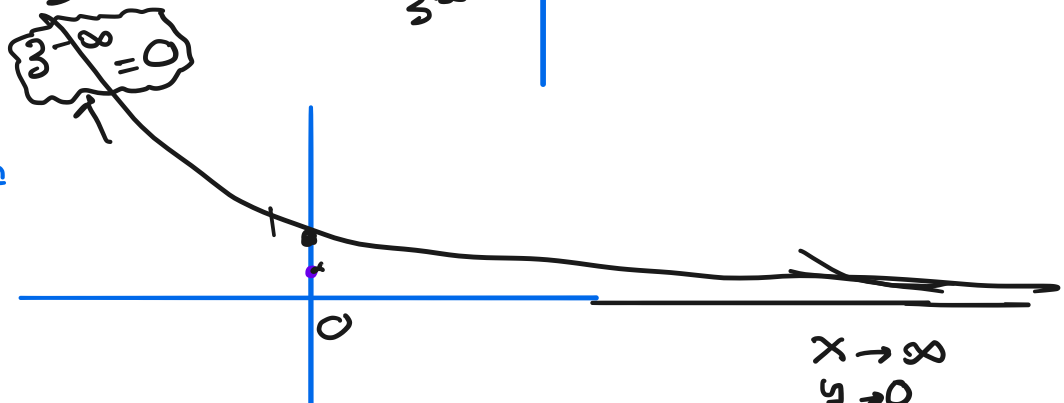
D) $y = -\log_{10} x$

E) $y = -\log(-x)$



B) $y = (3^{-1})^x = 3^{-x}$

$3^{-\infty} = \frac{1}{3^{\infty}} = 0$



1) $x \to \infty \quad y = 0$
2) $x \to -\infty \quad y = \infty$
3) $x = 0 \quad y_{mt} = 1$

$-\infty < x < \infty$

$y = \boxed{2 * 3^{-x+1}} + 1$ (exponent $-x+1$ → 0; $+1$)

1) $x \to \infty \longrightarrow y = 1$

2) $x \to -\infty \longrightarrow y \to \infty$

3) $x = 0 \quad y = 6$

4) $x = 1 \quad y = \boxed{2}$

Random point

$\boxed{-1+x}+\boxed{1}$

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

$\frac{2}{2} = 1$

$-1+1 = 0$

$y = 2(3^{-x+1})+1$

$y = 2(3^{-\infty+1})+1$

$y = (2)(0)+1$

$y = 0+1$

$y = 1$

$y = 2(3^{-(-\infty+1)})+1$

$y = 2(3^{\infty+1})+1$

$y = (2)(3^{\infty})+1$

$y = \infty$

$y = (2)(3^{-0+1}) = 2 \cdot 3^1 = 6$

$2(3)$

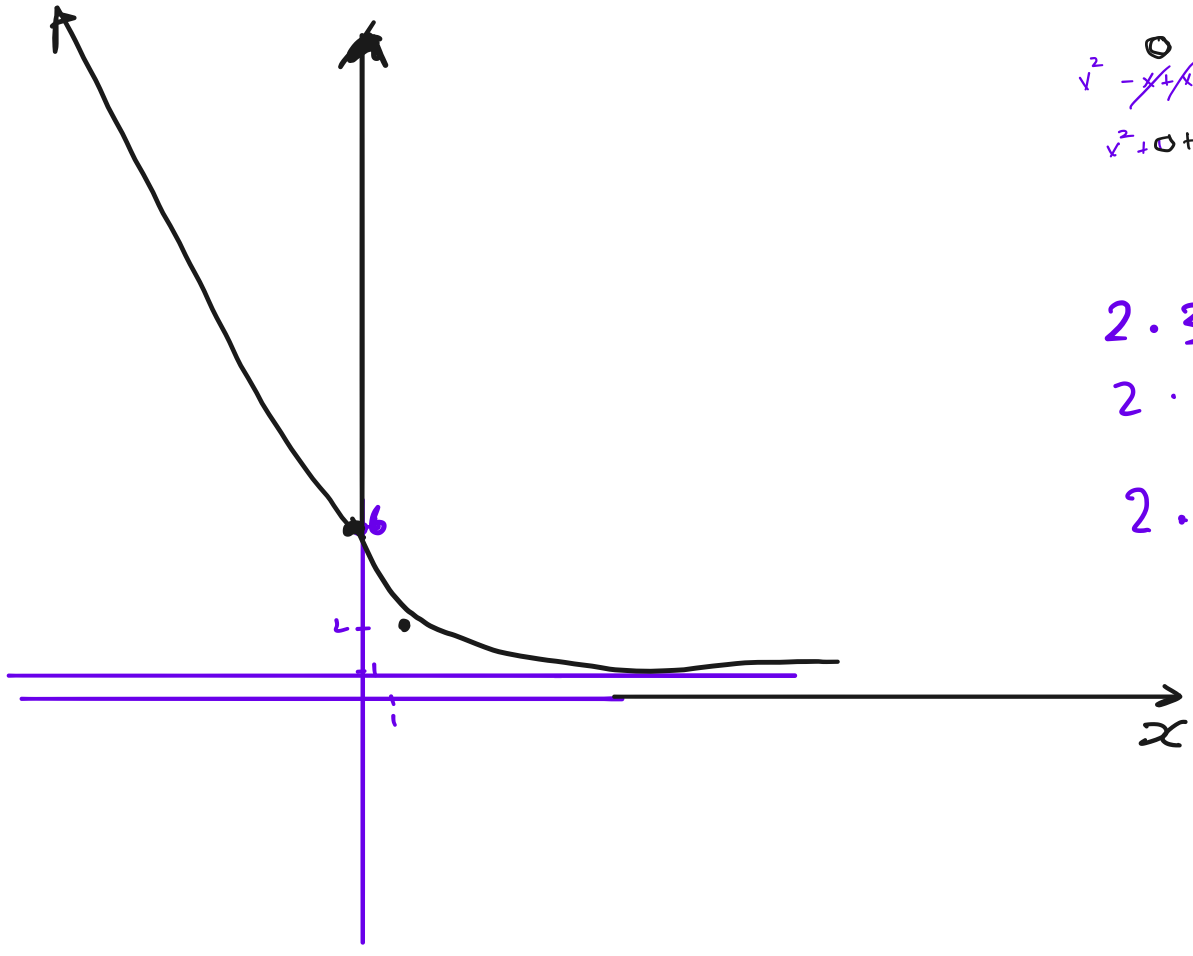
$x^2 - x + x + 1$

$x^2 + 0 + 1 = \boxed{x^2+1}$

$2 \cdot 3^{-(1)+1}$

$2 \cdot 3$

$2 \cdot 3^0 = 2$



Domain

c) $y = \log_3 x$ $\quad x > 0$

$x \to \infty$

D $y = -\log_{10} x$

$0 = \log_3 x$

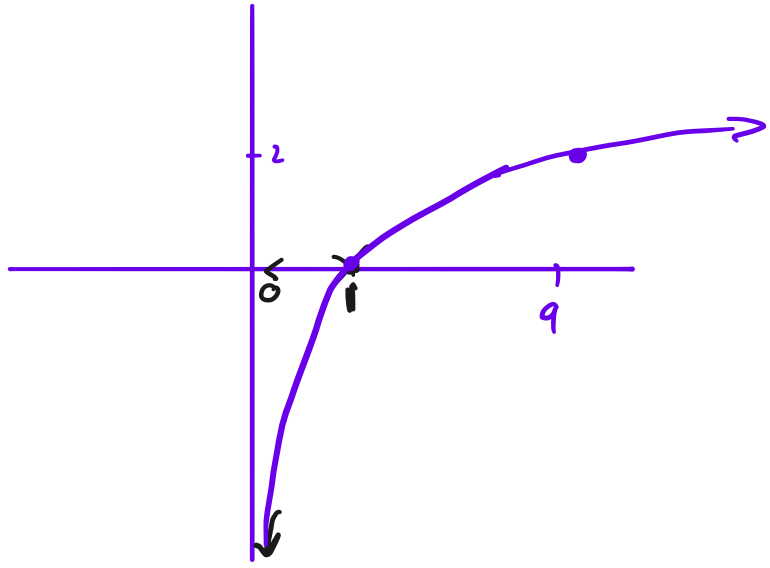
$3^0 = 3^{\log_3 x}$ $x = 1$

1) $x \to \infty$ $y \to \boxed{\infty}$

2) $x \to 0^+$ $y \to -\infty$

3) $x = \boxed{1}$ $y = 0$ x int

4) $x = 9$ $y = 2$

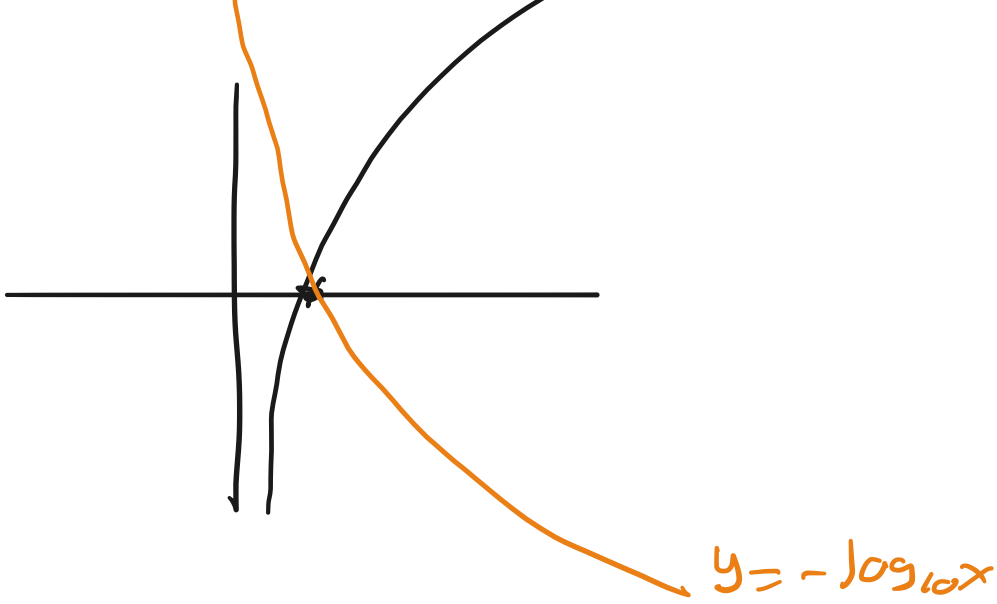


D $y = -\log_{10} x$

E) $y = \log(-x)$

$y = \log_{10} x$

D) $y = \log_{10} x$



$y = -\log_{10} x$

$x > 0$ DOMAIN

1) $x \to \infty$ $\quad y \to -\log_{10} \infty = -\infty$

2) $x \to 0^+$ $\quad y \to --\infty = \infty$

3) $y = 0$ $\quad 0 = -\log_{10} x$

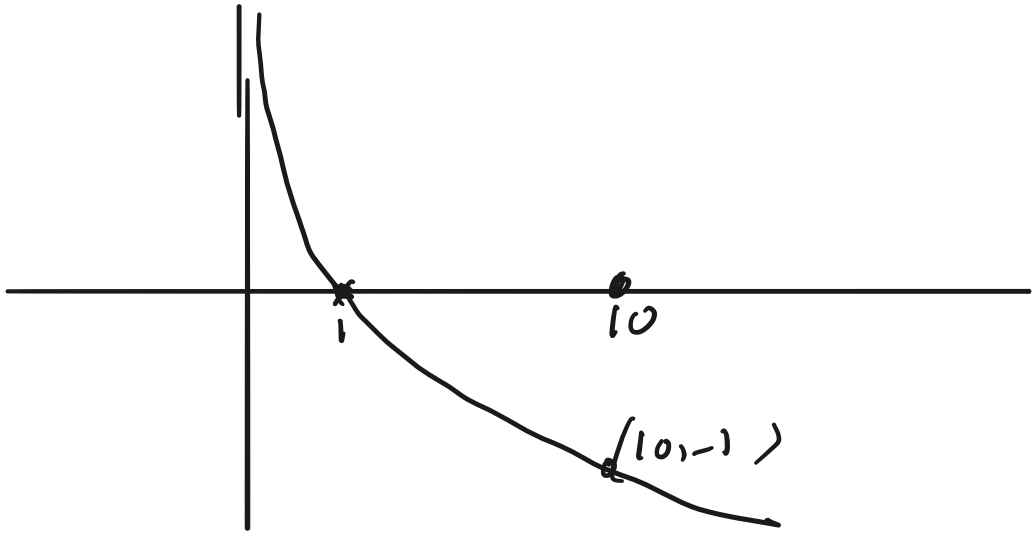
$x = 1$ $\quad 0 = \log_{10} x$

$10^0 = 10^{\log_{10} x}$

$1 = x$

4) $y = -\log_{10} 10$

$= -1$



Ej $y = \log(-x)$

$-x > 0$ $\boxed{x < 0}$

$x \to -\infty$ $y \to \log(\infty) = \infty$

$x \to 0^-$ $y = -\infty$

$x = -1$ $y = 0$

$x = -10$ $y = \log(--10) = 1$

$0 = \log(-x)$

$10^0 = 10^{\log(-x)}$

$1 = -x$ $\boxed{x = -1}$