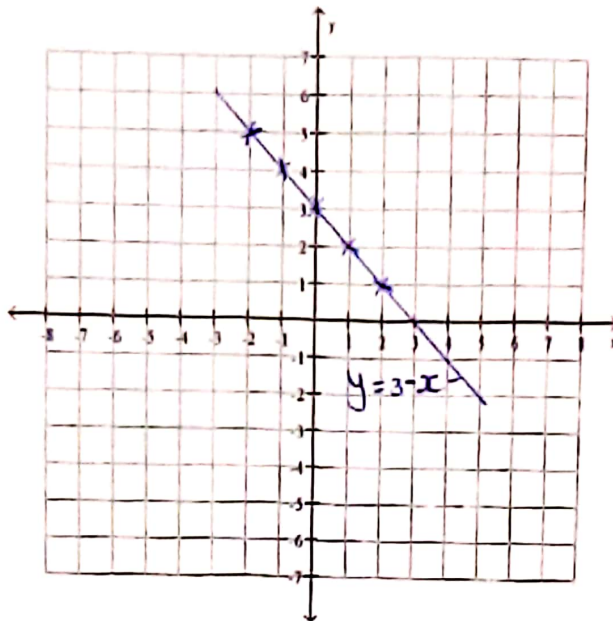


YOU MUST SHOW ALL WORK TO RECEIVE CREDIT

Graph the function.

1) $f(x) = 3 - x$

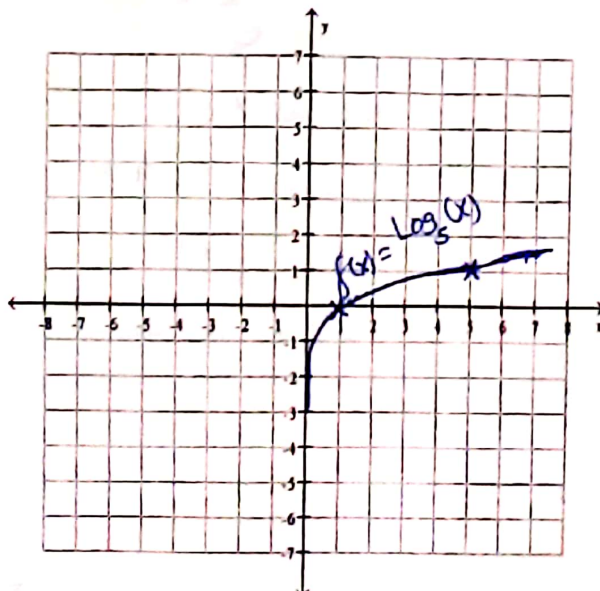


1) Sample table values of the function:

$$y = 3 - x$$

x	-2	-1	0	1	2
y	5	4	3	2	1

2) $f(x) = \log_5 x$



2) Sample table values of the function:

$$y = \log_5 x$$

x	1	5
y	0	1

- 3) The growth in the population of a certain rodent at a dump site fits the exponential function $A(t) = 286e^{0.031t}$, where t is the number of years since 1973. Estimate the population in the year 2000.

$$\Rightarrow A(t) = 286e^{0.031t}$$

$$\Rightarrow t = 2000 - 1973 = 27 \text{ years}$$

$$t = 27$$

$$\Rightarrow A(t) = 286e^{(0.031 \times 27)}$$

$$\Rightarrow A(t) = 286e^{(0.837)}$$

$$\Rightarrow A(t) = 660.496$$

$$= \underline{\underline{660}}$$

Use the interest formulas $A = P\left(1 + \frac{r}{n}\right)^{nt}$ or $A = Pe^{rt}$ to solve.

- 4) Suppose that you have \$12,000 to invest. Which investment yields the greater return over 8 years: 8.75% compounded continuously or 8.9% compounded semiannually?

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$= 12,000 \times \left(1 + \frac{8.9\%}{16}\right)^{(16 \times 8)}$$

$$= 12,000 \times \left(1 + \frac{0.089}{16}\right)^{128}$$

$$= 12,000 \times (1.0055625^{128})$$

$$= 12,000 \times 2.034046$$

$$= 24,408.60$$

$$= \$24,408.60$$

$$A = Pe^{rt}$$

$$= 12,000e^{(0.0875 \times 8)}$$

$$= 12,000 \times e^{0.7}$$

$$= 12,000 \times 2.01375$$

$$= 24,165.03$$

$$= \$24,165.03$$

The Compounded Continuously yields the greater return over the 8 years.

Convert to exponential form.

$$5) \log_3 \frac{1}{81} = -4$$

$$\Rightarrow \log_b(x) = y \Rightarrow b^y = x$$

$$= \log_3 \frac{1}{81} = -4 \Rightarrow 3^{-4} = \frac{1}{81}$$

$$= 3^{-4} = \frac{1}{81}$$

Write the logarithmic expression as a single logarithm with coefficient 1, and simplify as much as possible.

$$6) 7 \log_9 t - 6 \log_9 u - 3 \log_9 v$$

$$= \log_9(t^7) - \log_9(u^6) - \log_9(v^3)$$

$$= \log_9 \left(\frac{t^7}{u^6 v^3} \right)$$

$$= \log_9 \left(\frac{t^7}{u^6 v^3} \right)$$

Write the logarithm as a sum or difference of logarithms. Simplify each term as much as possible.

$$7) \log_3 \left(\frac{1}{27 p^5 q} \right)$$

$$= \log_3 \left(\frac{1}{27} \right) + \log_3(p^5) + \log_3(q)$$

$$= \log_3 \left(\frac{1}{27} \right) + 5 \log_3(p) + \log_3(q)$$

$$= \log_3(1) - \log_3(27) + 5 \log_3(p) + \log_3(q)$$

Evaluate to four decimal places:

$$8) \log_{18}(24.84)$$

$$= 0 - \log_3 27 + 5 \log_3 p + \log_3 q$$

$$= 5 \log_3 p + \log_3 q - \log_3 27$$

$$= 5 \log_3 p + \log_3 q - 3$$

9) Solve: $\left(\frac{1}{3}\right)^{6x+5} = 9x-1$

$$\Rightarrow 1 = (9x-1)e^{-\ln(3)(-6x-5)}$$

$$\Rightarrow 1 = \left(9\left(-\frac{-34-2\ln(3)}{18\ln(3)}\right)-1\right)e^{\ln(3)\left(-6\left(-\frac{-34-2\ln(3)}{18\ln(3)}\right)-5\right)}$$

$$= 1 \cdot e^{-\frac{-34-2\ln(3)}{3}+5\ln(3)} \left(\frac{-34-2\ln(3)}{2\ln(3)}-1\right)$$

$$\Rightarrow u = w_0 \left(\frac{2\ln(3)}{729e^{\frac{\ln(3)}{3}}} \right)$$

$$x = \frac{-3w_0 \left(\frac{2\ln(3)}{729e^{\frac{\ln(3)}{3}}} \right) - 2\ln(3)}{18\ln(3)}$$

$$x = 0.11133$$

Solve the logarithmic equation.

10) $\log_4(x-7) + \log_4(x-7) = 1$

$$= 2\log_4(x-7) = 1$$

$$= \frac{2\log_4(x-7)}{2} = \frac{1}{2}$$

$$= \log_4(x-7) = \frac{1}{2}$$

$$\Rightarrow x-7=2$$

$$\Rightarrow x=9$$

$$\underline{\underline{x=9}}$$

11) $\log(x+3) = 1 - \log x$

$$= \log_{10}(x+3) + \log_{10}(x) = 1 - \log_{10}(x) + \log_{10}(x)$$

$$= \log_{10}(x+3) + \log_{10}(x) = 1$$

$$= (x+3)x = 10$$

$$= x^2 + 3x - 10 = 0$$

$$\Rightarrow x_{1,2} = \frac{-3 \pm \sqrt{3^2 - 4 \times 1 \times (-10)}}{2 \times 1}$$

$$x_1 = 2$$

$$x_2 = -5$$

$$x = 2$$

Solve the equation. If necessary, round to thousandths.
12) $5^{x+4} = 4^x$

$$= 5^{x+4} = 4^x$$

$$= (x+5) \ln(5) = x \ln(4)$$

$$= x - \frac{4 \ln(5)}{\ln(5) - 2 \ln(2)}$$

$$= x = \frac{4 \ln(5)}{\ln(5) - 2 \ln(2)}$$

$$x = -28.85026$$

$$\Rightarrow x = \underline{\underline{-28.850}}$$