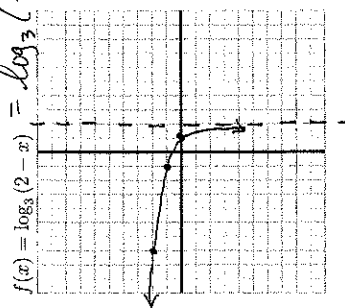


Do all problems. Give exact answers unless otherwise directed.

1. Graph the following function on the grid provided.



→ 2
hor. ref.

2. Prove that $f(x) = \frac{6x+8}{x}$ is one-to-one.

Pf Assume $f(a) = f(b)$.

$$\text{Then } \frac{6a+8}{a} = \frac{6b+8}{b}$$

$$\text{So } 6ab+8b = 6ab+8a$$

$$8b = 8a$$

$$b = a$$

$$\text{or } a = b.$$

So f is 1-1. $\square$

3. Rewrite the following expression in terms of logarithms with arguments of x , y , or z only.

$$\begin{aligned} \log_6 \left(\frac{x^2 \sqrt[3]{y^2}}{z^4} \right) &= \log_5 \left(x^2 y^{\frac{2}{3}} \right) - \log_5 (z^4) \\ &= 2 \log_5 (x) + \frac{2}{3} \log_5 (y) - 4 \log_5 (z) \end{aligned}$$

4. Evaluate each of the following exactly.

(a) $\log_9(1) = 0$

(b) $\log_4(2) + \log_4(8)$

$$= \log_4(16)$$

$$= \log_4(4^2)$$

$$= 2$$

(c) $2^{\log_2(\sqrt{5})}$

$$= (2^{\log_2(\sqrt{5})})^4$$

$$= (\sqrt{5})^4$$

$$= 25$$

5. An account has an initial deposit of \$2832 and the interest is 3.91%, compounded continuously.

- (a) Find the amount of money in the account in 4 years, to the nearest cent.

$$A = 2832 e^{.0391(4)} \approx \$3311.44$$

- (b) How long does it take for the balance in the account to quintuple (that is, grow to five times its original size), to the nearest month?

$$\begin{aligned} SP &= P e^{.0391t} \rightarrow t = \frac{\ln(5)}{.0391} \\ 5 &= e^{.0391t} \\ \ln(5) &= .0391t \\ &= 41.162 \text{ yrs} \\ &= 41 \text{ yrs, 2 months} \end{aligned}$$

6. Solve the following equations. Give the exact answers.

(a) $81^{2x+5} = 27^{3x+2}$

$$(3^4)^{2x+5} = (3^3)^{3x+2}$$

$$8x+20 = 27x+6$$

$$-19x = -14$$

$$x = \frac{14}{19}$$

(c) $\log_6(2x-12) = 2$

$$6^2 = 2x-12$$

$$48 = 2x$$

$$x = 24 \quad \checkmark$$

(b) $3e^{2x} - 5 = 7$

$$3e^{2x} = 12$$

$$e^{2x} = 4$$

$$2x = \ln(e^{2x}) = \ln(4)$$

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