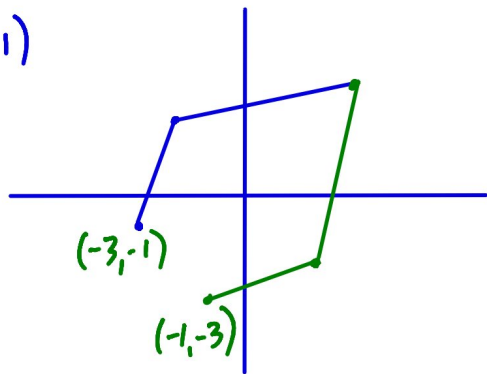


Practice Test Solutions

1)



2) $f(x) = 3 + 7x$ $g(x) = \frac{x-3}{7}$

$$\begin{aligned} f(g(x)) &= 3 + 7\left(\frac{x-3}{7}\right) \\ &= 3 + (x-3) \\ &= x \end{aligned}$$

$$\begin{aligned} g(f(x)) &= \frac{3+7x-3}{7} \\ &= \frac{7x}{7} \\ &= x \end{aligned}$$

PPP
Show $f(x) = 7 - \frac{1}{2}x$
and $g(x) = -2x + 14$
are inverses

3) $f(x) = 3 + \frac{1}{2}x$
 $y = 3 + \frac{1}{2}x$
 $x = 3 + \frac{1}{2}y$

$2(x-3) = 2 \cdot \frac{1}{2}y$
 $2x-6 = y$
 $f^{-1}(x) = 2x-6$

PPP
Find $f^{-1}(x)$
if
 $f(x) = -\frac{1}{5}x + 1$

$$4) a) 5^{1-2x} = \frac{1}{5}$$

$$5^{1-2x} = 5^{-1}$$

$$1-2x = -1$$

$$-2x = -2$$

$$x = 1$$

Change of base
 $\log_a b = \frac{\ln b}{\ln a}$

$$5) \log_7 A = x$$
$$7^x = A$$

$$b) 8^x = 4$$

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

$$3x = 2$$

$$x = \frac{2}{3}$$

PPP

$$a) 4^{3+2x} = \frac{1}{16}$$
$$b) 25^x = 125^3$$

$$6) e^{5x} = B$$

$$\ln B = 5x$$

PPP

$$\log_a 14 = y$$
$$10^{3x} = M$$

$$7) a) \log_4 \frac{1}{16} = x$$

$$4^x = \frac{1}{16}$$

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

$$x = -2$$

$$b) \log_{10} 1000 = x$$

$$10^x = 1000$$

$$x = 3$$

PPP

$$a) \log_3 \frac{1}{27}$$
$$b) \ln e^\pi$$

$$8) a) \log_3(3x-2) = 2$$

$$3^2 = 3x-2$$

$$9 = 3x-2$$

$$11 = 3x$$

$$x = \frac{11}{3}$$

$$b) \log_x 49 = 2$$

$$x^2 = 49$$

$$x = \sqrt{49}$$

$$x = 7$$

$$c) \frac{5 \cdot 3^{2x}}{5} = \frac{25}{5}$$

$$3^{2x} = 5$$

$$\ln 3^{2x} = \ln 5$$

$$\frac{\cancel{2x} \ln 3}{\cancel{2} \ln 3} = \frac{\ln 5}{(2 \ln 3)}$$

$$x \approx 0.732$$

$$d) 3^{1-2x} = 4^x$$

$$\ln 3^{1-2x} = \ln 4^x$$

$$(1-2x) \ln 3 = x \ln 4$$

$$(1-2x) 1.099 = x \cdot 1.386$$

$$\begin{array}{r} 1.099 - 2.198x = 1.386x \\ + 2.198x \quad + 2.198x \\ \hline 1.099 = 3.584x \\ \hline \frac{1.099}{3.584} = \frac{3.584x}{3.584} \end{array}$$

$$x \approx 0.307$$

$$e) 2 \log_5 X = 3 \log_5 4$$

$$\log_5 X^2 = \log_5 4^3$$

$$X^2 = 64$$

$$X = \pm \sqrt{64} = \pm 8$$

$$X = 8$$

$$f) \log_4(x+3) + \log_4(2-x) = 1$$

$$\log_4(x+3)(2-x) = 1$$

$$4^1 = (x+3)(2-x)$$

$$4 = -x^2 - x + 6$$

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

$$(x+2)(x-1) = 0$$

$$X = -2 \quad X = 1$$

PPP

a) $\log_5(2x+1) = 2$

b) $\log_x \frac{1}{36} = 2$

c) $6 \cdot 4^{5x} = 216$

9) a) $\ln \frac{x^3 y^2}{3}$

$\ln x^3 y^2 - \ln 3$

$\ln x^3 + \ln y^2 - \ln 3$

$3 \ln x + 2 \ln y - \ln 3$

d) $5^{2+x} = 3^{2x}$

e) $2 \log_3 x = \log_3 81$

f) $\log_5 x + \log_5 (x-24) = 2$

b) $\log(x^5 \sqrt{x+2})$

$\log x^5 + \log (x+2)^{\frac{1}{2}}$

$5 \log x + \frac{1}{2} \log (x+2)$

PPP

a) $\log \frac{a^4 b^2}{\sqrt[4]{c}}$

b) $\ln(6x^5)$

10) a) $3 \log x + 7 \log y - 2 \log 9$

$\log x^3 + \log y^7 - \log 9^2$

b) $\frac{1}{2} \ln(x+2) - 3 \ln x$

$\ln(x+2)^{\frac{1}{2}} - \ln x^3$

$\ln \frac{\sqrt{x+2}}{x^3}$

$\log \frac{x^3 y^7}{81}$

PPP

a) $5 \log x - 7 \log y - 8 \log z$

b) $\frac{1}{3} \ln x - 7 \ln(x+2)$

~~$\log \frac{x^3 y^7}{81}$~~

$$11) \begin{pmatrix} 0, 653 \\ 32, 799 \end{pmatrix}$$

$$A = 653e^{kt}$$

$$799 = 653e^{k \cdot 32}$$

$$1.224 = e^{32k}$$

$$\ln 1.224 = 32k$$

$$k = .0063$$

$$A = 653e^{.0063t}$$

$$A = 653e^{.0063 \cdot 100}$$

$$A = 1226 \text{ spiders}$$

$$12) A = A_0 e^{kt}$$

$$k = \frac{\ln 0.5}{\text{half-life}} = \frac{\ln 0.5}{8} \approx -.0866$$

$$A = 3e^{-.0866t}$$

$$A = 3e^{-.086 \cdot 13}$$

$$A = 0.97 \text{ grams}$$

PPP

On day 0 there are 5 zombies.
On day 100 there are 2551
zombies. How many on day
120?

A twinkie has a half-life
of 32 years. It weighs
4 oz now. How much
will it weigh in 48 years?