

Unit 5 review

1) a. $5^a = b$
 $\log_5 b = a$

b. $14^{x+2} = 33$
 $\log_{14} 33 = x+2$

c. $3^{2x} = 5+t$
 $\log_3(5+t) = 2x$

2) a. $\ln(2x) = 5$
 $e^5 = 2x$

b. $\log_3 x = b+4$
 $3^{b+4} = x$

c. $\log_2(x-3) = 4b$
 $2^{4b} = x-3$

3) a. $f(3.1) = \left(\frac{2}{5}\right)^{3.1+2}$

$f(3.1) \approx .0093$

b. $f(-2.2) = \left(\frac{2}{5}\right)^{-2.2+2}$

$f(-2.2) \approx 1.201$

c. $f\left(\frac{1}{2}\right) = \left(\frac{2}{5}\right)^{\frac{1}{2}+2}$

$f\left(\frac{1}{2}\right) = .101$

4) a. $g(x) = 4 - 3^{x+2}$
 up 4 units
 reflected over x-axis
 left 2

b. $g(x) = -2 + 3^{-x}$
 down 2 units
 reflect over y-axis

c. $g(x) = 5 + 3^{x-7}$
 up 5 units
 right 7 units

5) a. $e^{2x} = e^{x^2-63}$
 $2x = x^2 - 63$
 $0 = x^2 - 2x - 63$
 $0 = (x+7)(x-9)$
 $x = -7 \quad x = 9$

b. $3^{2x+1} = 81^{x-1}$
 $3^{2x+1} = 3^{4(x-1)}$
 $2x+1 = 4x-4$
 $5 = 2x$
 $\frac{5}{2} = x$

c. $x = \log_3 \sqrt{3}$
 $x = \log_3 3^{1/2}$
 $x = \frac{1}{2} \log_3 3$
 $x = \frac{1}{2}$

d. $3e^{2x+2} = 63$
 $e^{2x+2} = 21$
 $\ln 21 = 2x+2$
 $\frac{\ln 21 - 2}{2} = \frac{2x}{2}$
 $12.705 = x$

e. $4(7)^x - 4 = 360$
 $4(7)^x = 364$
 $7^x = 91$
 $\log_7 91 = x$
 $2.318 = x$

f. $\left(\frac{1}{3}\right)^x = 9^{x+3}$
 $3^{-x} = 3^{2(x+3)}$
 $-x = 2x+6$
 $-3x = 6$
 $x = -2$

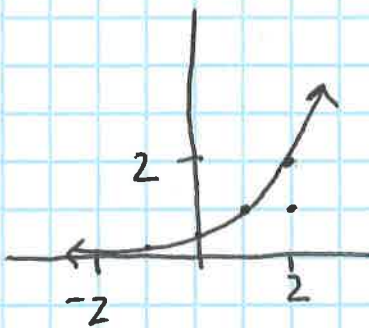
g. $e^x = 21$
 $\ln 21 = x$
 $3.045 \approx x$

h. $\log_6 36^x = \frac{2}{3}$
 $6^{2/3} = 36^x$
 $6^{2/3} = 6^{2x}$
 $\frac{2}{3} = 2x$
 $\frac{1}{3} = x$

i. $\log_3(x+5) - \log_3(x-3) = 3$
 $\log_3 \left(\frac{x+5}{x-3}\right) = 3$
 $\frac{x+5}{x-3} = 27$
 $27x - 81 = x + 5$
 $26x = 86$
 $\frac{26x}{26} = \frac{86}{26}$
 $x = \frac{43}{13}$

J. $\log(x) + \log(x+4) = \log(x+40)$
 $x^2 + 4x = x + 40 \rightarrow \log(x^2 + 4x) = \log(x + 40)$
 $x^2 + 3x - 40 = x$
 $(x+8)(x-5) = 0$
 $x = -8$ or $x = 5$
 $\log -8$
 $\log -8$
 $\log -8$

6) $f(x) = 2^{x-1}$



7) a. $\log_3 34 = \frac{\log 34}{\log 3} = \frac{\ln 34}{\ln 3} \approx 3.210$

b. $\log_{22} 5 = \frac{\log 5}{\log 22} = \frac{\ln 5}{\ln 22} \approx 0.521$

8) a. $\frac{1}{3} \log x + 2 \log y - \log z + 4 \log b$
 $\log \sqrt[3]{x} + \log y^2 - \log z + \log b^4$
 $\log \frac{\sqrt[3]{x} y^2 b^4}{z}$

b. $2 \ln c - \ln b + 3 \ln d$
 $\ln c^2 - \ln b + \ln d^3$
 $\ln \frac{c^2 d^3}{b}$

9) a. $\log 3 + 4 \log x - 3 \log y$

b. $\ln 3 + \frac{1}{4} \ln x - 2 \ln y$

c. $\log_4 64 + 3 \log x + \log y$

$3 + 3 \log x + \log y$

10)

a. $A = 2,200 \left(1 + \frac{0.062}{4}\right)^{4t}$

b. $A = 2200 \left(1 + \frac{0.062}{4}\right)^{4 \cdot 5}$
 $A = 2992.41$

c. $5000 = 2200 \left(1 + \frac{0.062}{4}\right)^{4t}$
 $\frac{25}{11} = \left(1 + \frac{0.062}{4}\right)^{4t}$

$\log \frac{25}{11} = \frac{4t \log \left(1 + \frac{0.062}{4}\right)}{4}$
 $t = 13.344 \text{ yrs}$

$B = 2200 e^{0.015t}$

$B = 2200 e^{0.015(5)}$
 $B = 2992.05$

c. $5000 = 2200 e^{0.015t}$
 $\frac{25}{11} = e^{0.015t}$

$\ln \frac{25}{11} = 0.015t$
 $13.349 \text{ yrs} = t$

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a. $6000 = 3400 e^{7r}$

$$\frac{60}{34} = e^{7r}$$

$$\frac{\ln \frac{60}{34}}{7} = \frac{7r}{7}$$

$$0.081 = r$$

8.1%

b. $10,200 = 3400 e^{.081t}$

$$3 = e^{.081t}$$

$$\frac{\ln 3}{.081} = \frac{.081t}{.081}$$

$$13.563 = t$$

$$13.563 = t$$

13.563 years