

Unit 3 Review

1. $y = 20000(1+0.05)^x$ $x = \#$ of yrs $y = \$$ in account
 $y = 20000(1.05)^5 = 41578.56359$
 $y \approx \$41,578.56$

2. $y = 20000(1-0.15)^x$ $x = \#$ of years $y =$ price of minivan
 $y = 20000(0.95)^5 = 15475.61875$
 $y \approx \$15,475.62$

3. $f(x) = 3^x$

a) $f(2) = 3^2 = 9$	c) $3^x = 81$ $\log_3 81 = x$ $x = 4$
b) $f(-1) = 3^{-1} = \frac{1}{3}$	d) $3^x = 0$ $\log_3 0 = x$ $x = \text{no solution}$
	e) $3^x = 8$ $\log_3 8 = x$ $x = 1.8928$

4. a) $5x^3 = 80$
 $x^3 = 16$
 $x = \sqrt[3]{16}$
 $x = 2.5198$

b) $3x^4 = 54$
 $x^4 = 18$
 $3x^4 = 270$
 $x^4 = 90$
 $x = \sqrt[4]{90}$
 $x = 3.08$

c) $2x^{1/3} = 126$
 $x^{1/3} = 63$
 $\sqrt[3]{x} = 63$
 $x = 63^3$
 $x = 250,047$

5. a) $\log_2 8 = y$ $2^y = 8$ $y = 3$

b) $\log_4 64 = y$ $4^y = 64$ $y = 3$

c) $\log_2 x = -6$ $2^{-6} = x$ $x = \frac{1}{64}$

d) $\log_3 \frac{1}{3} = y$ $3^y = \frac{1}{3}$ $y = -1$

e) $\log_2 x = -5$ $2^{-5} = x$ $x = \frac{1}{32}$

f) $\log_x \frac{1}{2} = 8$ $x^8 = \frac{1}{2}$ $x = \sqrt[8]{\frac{1}{2}}$ $x = 0.917$

6. a) $26 = 2(7^x) - 6$
 $26 = 2(7^x)$
 $13 = 7^x$
 $\log_7 13 = x$
 $x = 1.318$

b) $15.3 = 5^{(x+2)}$
 $\log_5 15.3 = x+2$
 $1.6949 = x+2$
 $-0.305 = x$

c) $75 - 5(3^x) = -150$
 $-5(3^x) = -225$
 $3^x = 45$
 $\log_3 45 = x$
 $x = 3.465$

7. a) $\log_4 64 = x-1$
 $3 = x-1$
 $4 = x$

b) $\log_4 \frac{1}{4} = x$
 $-3 = x$

c) $\log_9 (-11x+2) = \log_9 (x^2+30)$
 $-11x+2 = x^2+30$
 $0 = x^2+11x+26$
 $0 = (x+7)(x+4)$
 $x = -7$ $x = -4$

8) $\log(5x) = \log(2x+9)$
 $5x = 2x+9$
 $3x = 9$
 $x = 3$

8. a) $-6 \log_3(x-3) = -24$
 $\log_3(x-3) = 4$
 $3^4 = x-3$
 $81 = x-3$
 $84 = x$

b) $\log_5 \frac{1}{125} = x$
 $5^{-3} = x$

c) $\log_y \frac{1}{27} = -3$
 $y^{-3} = \frac{1}{27}$
 $y = 3$

d) $8^x = 190$
 $\log_8 190 = x$
 $x = 2.5233$

9. $\log_2(-4) = x \rightarrow 2^x = -4$ not possible. 2 to any exponent will be a positive value

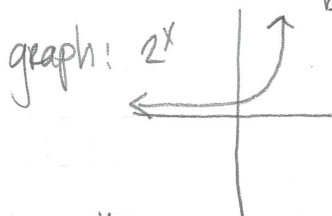
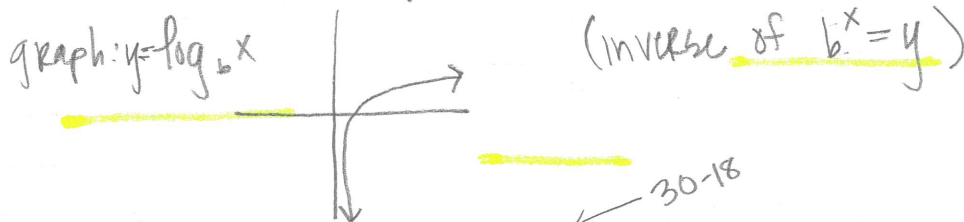


table:

x	-3	-2	-1	0	1	2	3
y	1/8	1/4	1/2	1	2	4	8

$\log_2(0) = x \rightarrow 2^x = 0$ not possible 2 to any exponent will be greater than zero

This means the domain of $\log_b x$ is $(0, \infty)$



10. a) $y = 500(1 + 0.065)^x$

b) $y = 500(1.065)^{12} = \$1064.55$

c) $10,000 = 500(1.065)^x$
 $20 = (1.065)^x$
 $\log_{1.065} 20 = x$
 $x = 47.57 \text{ yrs}$

11. a) $y = 150(1 + 0.155)^x$ b) $y = 150(1.155)^{12} = 845.425 \approx 845$ fish in pond after a year

c) $10,000 = 150(1.155)^x$
 $66.\bar{6} = 1.155^x$
 $\log_{1.155} 66.\bar{6} = x$
 $x = 29.144$ months

12. a) $b^4 = \frac{460}{880}$
 $b = \sqrt[4]{\frac{460}{880}}$
 $b = 0.85$

$880 = a(0.85)^{10}$
 $a = 4469.85$
 $y = 4469.85(0.85)^x$

b) $50 = 4469.85(0.85)^x$
 $0.01186 = 0.85^x$
 $\log_{0.85} 0.01186 = x$
 $x = 27.6465$ minutes