

## 8.2 Solving Exponential Equations & Inequalities

EX #1 Pg 480

$$2^x = 8^3$$

$$2^x = (2^3)^3$$

$$2^x = 2^9$$

$$x = 9$$

$$9^{2x-1} = 3^{6x}$$

$$(3^2)^{2x-1} = 3^{6x}$$

$$3^{4x-2} = 3^{6x}$$

$$4x-2 = 6x$$

$$-4x = 2$$

$$-1 = x$$

$$8^x = 2^5$$

$$x = 5$$

1A)  $4^{2n-1} = 64^3$

$$4^{2n-1} = 4^6$$

$$2n-1 = 6$$

$$2n = 7$$

$$n = 3.5$$

end begin

$$3^{2x-1} = 3^{6x}$$

$$2x-1 = 6x$$

$$-4x = 7$$

$$x = -1.75$$

EX #2 a)  $y = ab^x$

$$23000 = 7500b^4$$

$$\frac{23000}{7500} = b^4$$

$$3.067 = b^4$$

$$1.323 = b$$

2A)  $3,200,000$  in 2005.  
 $120,000$  in 2010

$$y = ab^x$$

$$120,000 = 3,200,000b^5$$

$$0.0375 = b^5$$

$$0.67 = b$$

$$y = 3,200,000(0.67)^x$$

b)  $y = 7500(1.323)^{12}$

$$y = 215,666$$

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

Principal, rate, months, years

EX #3:  $r = 4.2\% = .042$   
 $t = 15$   $P = 2500$

b)  $y = 3200,000(0.67)^{45}$

$$y = 0.03$$

$$y = 0$$

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

$$A = 2500(1 + \frac{0.042}{12})^{12(15)}$$

$$A = 2500(1.0035)^{180}$$

$$A = 4688.87$$

3)  $A = 100(1 + \frac{0.12}{24})^{24(20)}$

$$A = 100(1.005)^{480}$$

$$A = 127.12$$

EX #4)  $16^{2x-3} < 8$

$$(4^4)^{2x-3} < 2^3$$

$$8^{2x-3} < 2^3$$

$$8x-12 < 3$$

$$8x < 15$$

$$x < 1.875$$

4A)  $3^{5x-1} = \frac{1}{27}$

$$3^{5x-1} = 3^{-3}$$

$$5x-1 = -3$$

$$5x = -2$$

$$x = -0.4$$

# 8.2 Solving Exponential Equations & Inequalities

Ex #1a)  $2^x = 8^3$   
 $2^x = (2^3)^3$   
 $2^x = 2^9$   
 $x = 9$

b)  $9^{2x-1} = 3^{6x}$   
 $(3^2)^{2x-1} = 3^{6x}$   
 $3^{4x-2} = 3^{6x}$   
 $4x-2 = 6x$   
 $-4x = 2$   
 $x = -\frac{1}{2}$

$x = 5$   
 $x = 5$

1A)  $4^{2n-1} = 64^3 = 4^6$   
 $4^{2n-1} = 4^6$   
 $2n-1 = 6$   
 $2n = 7$   
 $n = \frac{7}{2}$

$\frac{-2}{-4} = \frac{2x}{-4}$   
 $-\frac{1}{2} = -x$   
 $x = \frac{1}{2}$

2A) 3,200,000 in 2005.  
 420,000 in 2010

$y = ab^x$

$420,000 = 3,200,000 b^5$   
 $\frac{420,000}{3,200,000} = \frac{3,200,000}{3,200,000} b^5$   
 $0.13125 = b^5$   
 $0.67 = b$   
 $y = 3,200,000 (0.67)^x$   
 $y = 3.2 (0.67)^x$

Ex #2a)  $y = ab^x$   
 $23000 = 7500 b^4$   
 $\frac{23000}{7500} = \frac{7500}{7500} b^4$   
 $3.067 = b^4$   
 $1.323 = b$

b)  $y = 7500 (1.323)^{12}$   
 $y = 215,606.5$

b)  $y = 3200,000 (0.67)^{45}$   
 $y = 0.03$   
 $y = 0$

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

Compound Interest.  
 P: principal, r: rate, n: months, t: years

EX #3:  $r = 4.2\% = .042$   
 $n = 12$   $P = 2500$   
 $t = 15$

$A = P \left(1 + \frac{r}{n}\right)^{nt}$   
 $A = 2500 \left(1 + \frac{0.042}{12}\right)^{12(15)}$   
 $A = 2500 (1.0035)^{180}$   
 $A = 4688.87$

EX #4)  $16^{2x-3} < 8$   
 $(2^4)^{2x-3} < 2^3$   
 $8x-12 < 3$   
 $8x < 15$   
 $x < \frac{15}{8}$

3)  $A = 100 \left(1 + \frac{0.12}{24}\right)^{24(20)}$   
 $A = 100 (1.005)^{480}$   
 $A = 127.12$

4A)  $3^{2x-1} \geq \frac{1}{27}$   
 $3^{2x-1} \geq 3^{-3}$   
 $2x-1 \geq -3$   
 $2x \geq -2$   
 $x \geq -1$