

$$24. \quad \overset{-11}{11} - 6^x = \overset{-11}{3}$$

$$-\frac{6^x}{-1} = \frac{-8}{-1}$$

$$6^x = 8$$

$$\log_6 8 = x$$

$$\frac{\log 8}{\log 6} = 1.161$$

$$22. \quad 2^{x+1} = 30$$

$$\log_2 30 = x + 1$$

$$\frac{\log 30}{\log 2} = x + 1$$

$$4.907 = x + 1$$

-1 -1

$$3.907 = x$$

b.6 Natural Logarithms
 base e
 Natural base
 Common Logarithms base 10

e Euler's Number

\$1 Annual interest
 rate 100% time 1 year

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

Annual
 $n=1$ $A = 1 \left(1 + \frac{1}{1} \right)^{1(1)} = 2$

Semiannual
 $n=2$ $A = 1 \left(1 + \frac{1}{2} \right)^{2(1)} = 2.25$

Quarterly
 $n=4$ $A = 1 \left(1 + \frac{1}{4} \right)^{4(1)} = 2.44$

Monthly
 $n=12$ $A = 1 \left(1 + \frac{1}{12} \right)^{12(1)} = 2.61$

Daily
 $n=365$ $A = 1 \left(1 + \frac{1}{365} \right)^{365(1)} = 2.71$

Hourly
 $n=8760$ $A = 1 \left(1 + \frac{1}{8760} \right)^{8760(1)} = 2.7182$

Every minute
 $n=525,600$ $A = 1 \left(1 + \frac{1}{525,600} \right)^{525,600(1)} = 2.7182$

Every Second
 $n=31,536,000$ $A = 1 \left(1 + \frac{1}{31,536,000} \right)^{31,536,000(1)} = 2.7182$



$$e \approx 2.71828$$

$$e \approx 2.72$$

$$\frac{e^x}{LN}$$

$$7^1 = 7$$

Calc and LN

$$e^{\wedge}(1)$$

$$e^1 = 2.71828$$

Continuous Compounding

$$A = Pe^{rt}$$

A ending Amount

P Principal beginning amount

r rate decimal

t time years

18 month
t=1.5

36 months
t=3

\$500 2% t=8 years

Continuous Compounding

$$A = Pe^{rt}$$

$$A = 500(e^{.02(8)})$$

$$A = 500e^{1(.02 * 8)}$$

$$A = \$586.76$$

Natural Base

 e

$$e^3 = 20.09$$

$$\text{Ind LN } e^x \\ e^{\wedge}(3)$$

$$2.72 \wedge 3 = 20.12$$

$$2.718 \wedge 3 = 20.08$$

$$4e^2 = 29.56$$

$$4e^{\wedge}(2)$$

 \log_e \ln

$$e^2 = 7.39 \quad 3^2 = 9$$

$$\log_e 7.39 = 2 \quad \log_3 9 = 2$$

$$\ln 7.39 = 2$$

$$\ln 9.46 = 2.2471$$

$$e^{2.2471} \approx 9.46$$

$$12. \quad 7^x = 908$$

$$\log_7 908 = x$$

Change
of
base

$$\frac{\log_{10} 908}{\log_{10} 7} = x$$

$$\frac{\ln 908}{\ln 7} = x$$

$$3.50 = x$$

$$3.50 = x$$

$$\log_b x = \frac{\log_a x}{\log_a b}$$

p 397 12-34 E

$$13. \quad e^9$$

Calculator

2nd LN $\rightarrow e^x$

$$e^{(9)}$$

$$8103.084$$

$$13. \quad \ln 7$$

Calculator

LN 7

$$1.946$$