

## Solving Equations using Logarithms

$$\textcircled{1} \log_{10} 100 = x$$

$$10^x = 100$$

$$10^x = 10^2$$

$$x = 2$$

$$\textcircled{2} \log_2 7 = x$$

$$\frac{x \cdot (.14)}{.14} = \frac{.37}{.14}$$

NM

< 3 CR  
2.9 HP

$$\log 2^x = \log 7$$

$$\frac{x \cdot (\log 2)}{\log 2} = \frac{(\log 7)}{(\log 2)}$$

$$x \approx 2.81$$

$$\textcircled{3} \ln_e e = x$$

$$\boxed{\ln e = 1}$$

$$\ln x = \log_e x$$

$$e^x = e$$

$$e \approx 2.71\dots$$

$$x = 1$$

$$\textcircled{4} \ln e^x = \ln 6$$

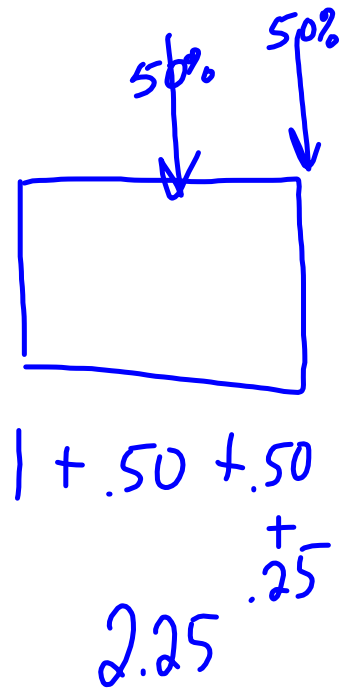
~~$$\log_{10} e = x$$~~
~~$$10^x = e$$~~

$$2.71\dots \stackrel{?}{=} 6$$

$$x(\underbrace{\ln e}_1) = \ln 6$$

$$x = \ln 6 \approx 1.79$$

\$	# of times get in.	\$
\$1	1	$1 + 1 = \$2$
100%	2	2.25
	3	
	4	
	5	
	6	
	⋮	
	⋮	e (\$2.71)



$$\textcircled{5} \frac{22}{44} \leq \frac{44(1 - e^{2x})}{44}$$

$$.5 \leq 1 - e^{2x}$$

$$\frac{-.5}{-1} \leq \frac{-1e^{2x}}{-1}$$

$$\ln .5 \geq \ln e^{2x}$$

$$\frac{\ln .5}{2} \geq \frac{2x}{2} (\underbrace{\ln e}_1)$$

$$\textcircled{-35 \geq x}$$

$$\textcircled{6} \frac{6.5}{-16.25} = \frac{-16.25 \cdot \ln x}{-16.25}$$

$$-.4 = \ln_e x$$

$$e^{-.4} = x$$

$$\log_3 9 = 2$$

$$3^2 = 9$$

$$\textcircled{.67 \approx x}$$

$$\textcircled{7} -4.5 \geq -2e^{.031t}$$

$$\textcircled{8} 3^{2x} = 7^{x-1}$$

Solving equations using logs

①  $\log_{10} 100 = x$      $10^x = 100$      $x=2$

②  $\log_2 7 = x$      $2^x = 7$   
 $\log 2^x = \log 7$   
 $x \cdot \frac{\log 2}{\log 2} = \frac{\log 7}{\log 2}$      $x \approx 2.81$

③  $\ln_e e = x$      $e^x = e$      $\ln e = 1$   
 $x = 1$

④  $\ln_e 7 = x$      $\ln e^x = \ln 7$      $x < 2$   
 $x(\ln e) = \ln 7$   
 $x = \ln 7 \approx 1.95$

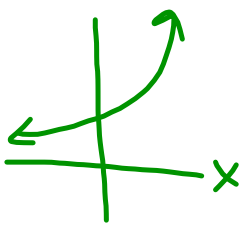
⑤  $\frac{6.5}{-16.25} = \frac{-16.25 \ln x}{-16.25}$   
 $-4 = \ln_e x$   
 $e^{-4} = x$

$2^{nd}$   $\ln$   $-.4$  Enter  
 $.67 = x$

⑥  $\frac{22}{44} \leq \frac{44(1-e^{2x})}{44}$   
 $.5 \leq 1 - e^{2x}$   
 $-.5 \leq -e^{2x}$   
 $\ln .5 \geq \ln e^{2x}$   
 $\ln .5 \geq 2x(\ln e)$   
 $\frac{\ln .5}{2} \geq \frac{2x}{2}$      $x \leq -.35$

⑦  $\frac{-4.5}{-2} \geq \frac{-2e^{.031x}}{-2}$      $3^{2x} = 7^{x-1}$   
 $\ln 2.25 \leq \ln e^{.031x}$      $\frac{2x(\log 3)}{\log 3} = \frac{(x-1)\log 7}{\log 3}$   
 $\ln 2.25 \leq .031x(\ln e)$      $2x = \frac{(x-1)1.7712437}{.49}$   
 $\frac{\ln 2.25}{.031} \leq \frac{.031x}{.031}$      $2x = \frac{1.771243749x - 1.7712437}{.49}$   
 $26.16 \leq x$      $2.287562508x = \frac{-1.7712437}{.49}$   
 $x \approx -7.74$      $.2287562508x = -1.7712437$

Pg. 736 # 36-41, 44



$$\log_2 A + \log_2 B = \log_2 AB$$

$$\textcircled{50} \log_4 (x-3) \oplus \log_4 (x+3) = 2$$

$$\log_4 (-8) = x \quad \log_4 (x-3)(x+3) = 2$$

$$4^x = -8$$

$$4^{-3} = \frac{1}{4^3}$$

$$\log_4 (x^2 - 9) = 2$$

$$4^2 = x^2 - 9$$

$$16 = x^2 - 9$$

$$-16$$

$$0 = x^2 - 25$$

$$0 = (x-5)(x+5)$$

$$x=5 \quad x=-5$$

$$\log_3 9 = x$$

$$3^x = 9$$

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$$10^{4\log_{10} 2} = x$$

$$3^2 = 9$$
$$\log_3 9 = 2$$

$$\log_{10}(x) = 4\log_{10} 2$$

$$\log_{10} x = \log_{10} 2^4$$

$$x = 16$$