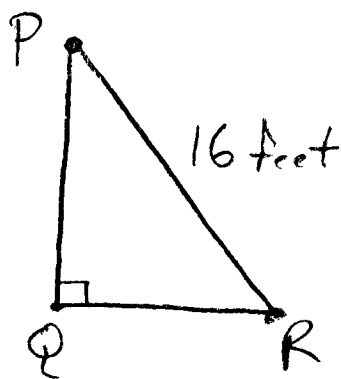


Alg. 2 BE | TUESDAY 4-27-10

ACT "REAL" ① The hypotenuse of the right triangle $\triangle PQR$ is 16 feet. The sine of $\angle P$ is $\frac{3}{5}$. Find $\overline{QR}$.



ANS

$$\sin = \frac{o}{h} = \frac{\overline{QR}}{16} = \frac{3}{5}$$

$$\therefore \overline{QR} = \frac{3}{5} \cdot 16$$

$$\overline{QR} = \frac{48}{5} = 9.6 \text{ ft}$$

Alg. 2 Homework Review Pg 549 #4-7, 9-11

$$\textcircled{4} \log 4 = \boxed{0.6021}$$

$$\textcircled{5} \log 23 = \boxed{1.3617}$$

$$\textcircled{6} \log 0.5 = -0.3010$$

$$\textcircled{7} 9^x = 45 \quad \therefore \log 9^x = \log 45$$

$$x \log 9 = \log 45$$

$$x = \frac{\log 45}{\log 9} = \frac{1.65321}{0.95424}$$

$$\text{CK } 9^{1.7325} \stackrel{?}{=} 45$$

$$45.001 \hat{=} 45 \checkmark$$

$$\boxed{x = 1.7325}$$

$$\textcircled{9} 3.1^{a-3} = 9.42 \quad \therefore \log 3.1^{a-3} = \log 9.42$$

$$(a-3) \log 3.1 = \log 9.42$$

$$a-3 = \frac{\log 9.42}{\log 3.1}$$

$$\text{CK } 3.1^{4.9824-3} \stackrel{?}{=} 9.42$$

$$3.1^{1.9824} \stackrel{?}{=} 9.42$$

$$9.4205 \hat{=} 9.42 \checkmark$$

$$a = 3 + \frac{0.97405}{0.49136}$$

$$a = 3 + 1.9824 = \boxed{4.9824}$$

$$\textcircled{10} \quad 11^{x^2} = 25.4$$

$$\log 11^{x^2} = \log 25.4$$

$$x^2 = \frac{\log 25.4}{\log 11} = \frac{1.40483}{1.041392} = 1.348993$$

$$x = \pm \sqrt{1.348993} = \boxed{\pm 1.1615}$$

$$\underline{\text{OK}} \quad 11^{(\pm 1.1615)^2} \stackrel{?}{=} 25.4$$

$$25.39987 \stackrel{?}{=} 25.4 \checkmark$$

$$\textcircled{11} \quad 7^{t-2} = 5^t \quad \therefore \log 7^{t-2} = \log 5^t$$

$$t-2 \log 7 = t \log 5$$

$$t-2 = \frac{\log 5}{\log 7} t = \frac{.69897}{.84510} t$$

$$t-2 = .82709 t$$

$$1.00000 t - .82709 t = 2$$

$$\frac{.17291 t}{.17291} = \frac{2}{.17291}$$

$$\underline{\text{OK}} \quad 7^{11.5667-2} \stackrel{?}{=} 5^{11.5667} \quad \boxed{t = 11.5667}$$

$$121562443 \stackrel{?}{=} 121555986 \checkmark$$

Ch. 10-5, Base e and Natural Logarithms

e irrational number

$$e \approx 2.71828182845904523536\dots$$

e fundamental constant found
(basic)

throughout math and science.

Like π , it is calculated using
infinite series.

$$e = \frac{2}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots$$

MORE TERMS
"
MORE DECIMALS

$$2 = 2$$

$$2 + \frac{1}{2} = 2.5$$

$$2 + \frac{1}{2} + \frac{1}{6} = 2.6\dots$$

$$2 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} = 2.708\overline{3}\dots$$

$$2 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} = 2.716\dots$$

$$2 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} + \frac{1}{720} = 2.7180\overline{5}\dots$$

$$2 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} + \frac{1}{720} + \frac{1}{5040} = 2.718253968\dots$$

REF. "e THE STORY OF A NUMBER" by Eli MAOR

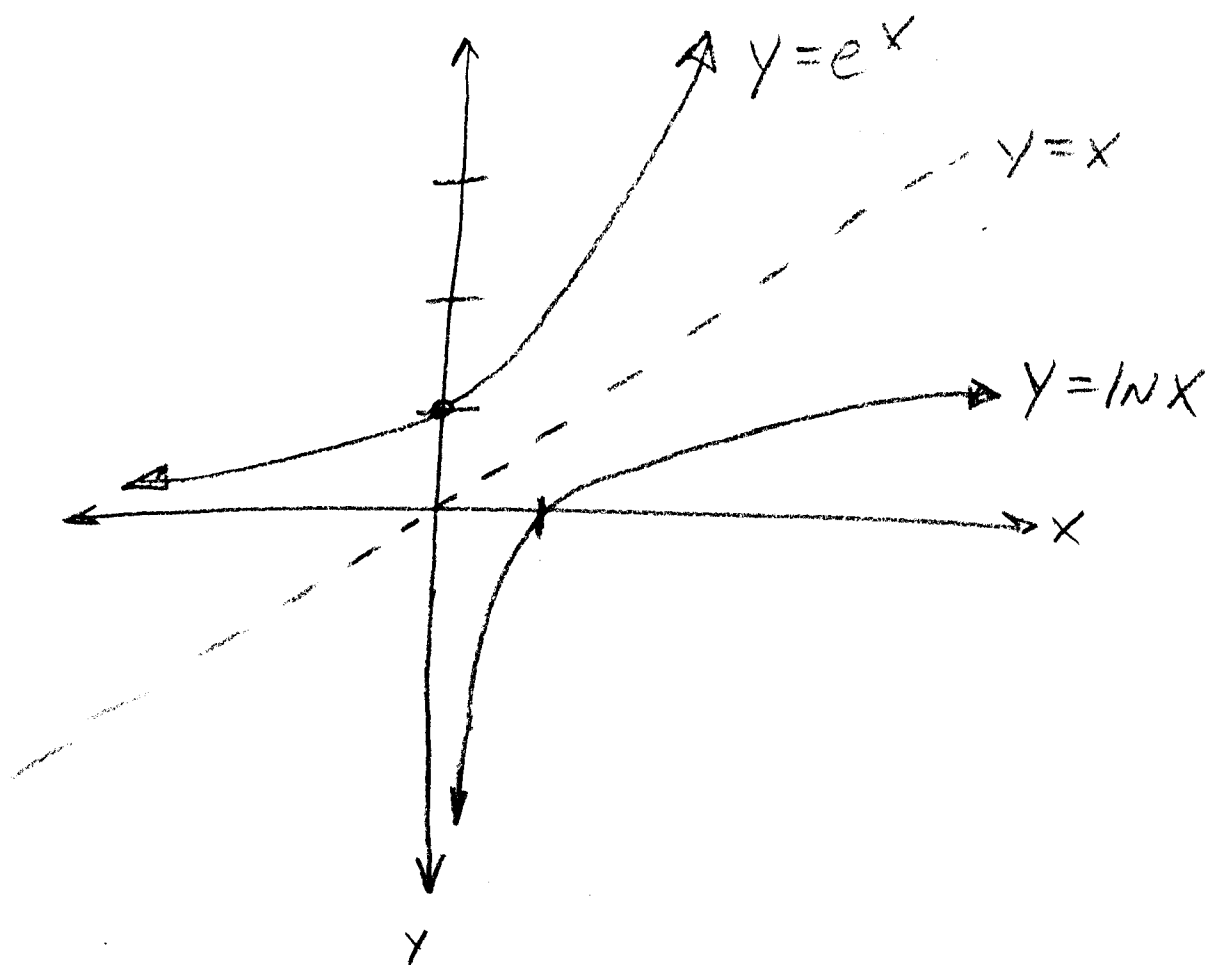
Normally $\ln x$ means $\log_e x$

NOTE: $\ln e = ?$

$$e^? = e$$

$$e^1 = e \quad \therefore \ln e = 1$$

Exponential $y = e^x$ growth since $e > 1$
 Logarithmic $y = \ln x$ inverse function of $y = e^x$



Ex 3 Change to exponential: $e^x = 5$

Pg
555

$$\log_e 5 = x$$

$$\therefore \boxed{\ln 5 = x}$$

Change to logarithmic: $\ln x = 0.6931$

$$\boxed{e^{0.6931} = x}$$

Ex 4 Evaluate: (A) $e^{\ln 7}$

$\nwarrow$ $\ln 7$ is the exponent
of e that gives you 7
 $\therefore e$ to this power = 7

$$\boxed{e^{\ln 7} = 7}$$

(B) $\ln e^{4x+3}$

$$(4x+3) \ln e$$

$$(4x+3) \underbrace{1} = \boxed{4x+3}$$

If the equation you are trying to solve involves e , take "LN" of both sides, NOT "log" !

Ex 5 Solve $5e^{-x} - 7 = 2$

$$5e^{-x} = 9$$

$$e^{-x} = \frac{9}{5}$$

$$\ln e^{-x} = \ln\left(\frac{9}{5}\right)$$

$$-x = 0.587787$$

$$x = -0.587787$$

ck $5e^{-(-.587787)} - 7 \stackrel{?}{=} 2$

$$5e^{.587787} - 7 \stackrel{?}{=} 2$$

$$5(1.80000) - 7 \stackrel{?}{=} 2$$

$$9 - 7 \stackrel{?}{=} 2 \checkmark$$

Ex 7 Solve $\ln 5x = 4$

$$e^4 = 5x$$

$$\frac{e^4}{5} = x$$

$$x = \frac{54.59815}{5}$$

$$x = 10.91963$$

$$\underline{\underline{CK}} \quad \ln(5 \cdot 10.91963) \stackrel{?}{=} 4$$

$$3.99999 \stackrel{?}{=} 4 \checkmark$$

Homework: Pg 557 # 4-11, 13, 16