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- Return stuff — April 12, 2018
- Announce: MML down for maintenance 4/21 1a-9a
- Announce: Extra Credit workshop Fri 4/13 1-2:15pm in 7-256
- Finish §6.6 : Logarithmic and Exponential Equations (pp 109-113)
- Start §6.7 : Financial Models (pp 114-117)
- 7 days until Chapter 6 Test. To study, complete the Chapter 6 Test Practice Problems homework assign. in MML

P 109 #18 (Tips 1,2,3) Turn this C.A problem in a IA problem

$$\log_a(x-8) - \log_a(x+5) = \log_a(x-4) - \log_a(x+6)$$

1st step: Domain (arguments > 0)

$x-8>0$ and $x+5>0$ and $x-4>0$ and $x+6>0$

$x>8$ and $x>-5$ and $x>4$ and $x>-6$

→ the only one we need, because all of the others are smaller

$$\log_a(x-8) - \log_a(x+5) = \log_a(x-4) - \log_a(x+6)$$

Rule 7 Rule 7

$$\log_a\frac{x-8}{x+5} = \log_a\frac{x-4}{x+6}$$

$$\frac{x-8}{x+5} = \frac{x-4}{x+6}$$

This is an Intermediate Algebra problem

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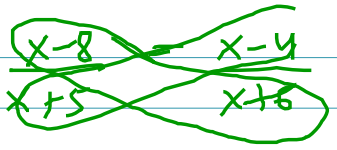

$$(x-4)(x+5) = (x+6)(x-8)$$

$$x^2 + 5x - 4x - 20 = x^2 - 8x + 6x - 48$$

$$x^2 + x - 20 = x^2 - 2x - 48$$

$$-x^2 \qquad\qquad -x^2$$

$$x - 20 = -2x - 48$$

$$3x = -28$$

$$x = \frac{-28}{3}$$ → possible solution. But this does not match with the domain, which says that x must be > 8.

So, NO solution to this problem.

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p.110 #23 (Tips 5.8) Solve for x

$$6^{1-6x} = 7^x$$

~~$6^{1-6x} = 7$~~

(a) $\ln 6^{1-6x} = \ln 7^x$

(b) $(1-6x)\boxed{\ln 6} = x\boxed{\ln 7}$

(c) $\boxed{\ln 6} \cdot 1 - \boxed{\ln 6} \cdot 6x = x\boxed{\ln 7}$

(d) $\boxed{\ln 6} = 6x\boxed{\ln 6} + x\boxed{\ln 7}$

$\boxed{\ln 9 \text{ DMFD}}$ MEMORIZE

(a) - Take the natural log of both sides

(b) - Then use Rule 9 on both sides

(c) - Distribute

(d) - Move (all terms with variable must be on the same side

(e) Factor

(f) Divide

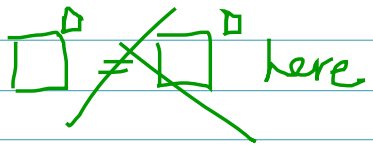
(e) $|\ln 6| = x\,(6|\ln 6| + |\ln 7|)$

(f) $\dfrac{|\ln 6|}{6\ln 6 + \ln 7} = \dfrac{x\,(6|\ln 6| + |\ln 7|)}{6\ln 6 + \ln 7}$

$$\frac{|\ln 6|}{6|\ln 6| + |\ln 7|} = x$$ exact answer

$x \simeq 0.141$ (3 dec places appr)

#28 Tips 1, 4, 7, 8



$3^{2x} + 3^{x+1} - 54 = 0$

We will use "u" substitution

Goal: rewrite every x to be of the form (3^x).

Obs: $(a^m)^n = a^{mn}$ $\qquad a^m \cdot a^n = a^{m+n}$

$(a^m)^n = a^{nm}$ $\qquad a^m \cdot a^n = a^{n+m}$

$(3^x)^2 = 3^{2x}$ $\qquad 3(3^x) = 3^1 \cdot 3^x = 3^{x+1}$

$(3^x)^2$ first term; $3(3^x)$ middle term

So:

$(3^x)^2 + 3(3^x) - 54 = 0$

$3^x \to u$ replace: $u^2 + 3u - 54 = 0$

$u^2 + 3u - 54 = 0$

factor $(u+9)(u-6) = 0$

$u + 9 = 0$ $\quad$ $u - 6 = 0$

$u = -9$ $\quad$ $u = 6$

Put it back : $u \to 3^x$

$3^x = -9$ $\quad$ $3^x = 6$ $\quad$ use the converter

$x = \log_3(-9)$ $\quad$ $\boxed{x = \log_3 6}$

extraneous (because we only can have log of positive real numbers) $\quad$ final answer (exact)

p114 $\quad$ 6.7 Financial Models

"by" → tells you n

$$\boxed{F = P\left(1 + \frac{r}{n}\right)^{n \cdot t}}$$

But, if n is continuously, we use this formula:

$$\boxed{F = Pe^{rt}}$$

#67,39 $\quad$ $F = P\left(1 + \frac{r}{n}\right)^{nt}$

$F = 1550$

$P = 1000$

"by" → $n = 4$

$r = 5\%$ → divide by 100 → 0.05

t = solve for this

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

$$1550 = 1000\left(1+\frac{0.05}{4}\right)^{4t}$$

$$\frac{1550}{1000} = \frac{1000\,(1.0125)^{4t}}{1000} \quad \text{(now, "hit it with a log")}$$

$$1.55 = 1.0125^{4t} \quad \text{(now, use the converter)}$$

$$\frac{4t}{4} = \frac{\log_{1.0125} 1.55}{4}$$

$$t = \frac{\log_{1.0125} 1.55}{4} \quad \text{exact answer}$$

$$t \approx 8.82 \text{ years} \quad \rightarrow \text{answer for the first question}$$

Now, continuously compounded:

$$F = Pe^{rt} \rightarrow \frac{1550}{1000} = \frac{1000e^{0.05t}}{1000}$$

$F = 1550$
$P = 1000$
$r = 0.05$
t = Solve for this

$$1.55 = e^{0.05t} \quad \text{(hit it with a log)}$$

$$\frac{0.05t}{0.05} = \frac{\log_e 1.55}{0.05}$$

$$t = \frac{\ln 1.55}{0.55} \quad \text{calculator}$$

$$t \approx 8.76 \text{ years}$$

p.115 (#21) $F = Pe^{rt}$ (continuously)

$F = 50$

$P =$ find this

$r = 3\% = 0.03$

$t = 1\frac{3}{4} = 1.75$

↳ $\frac{4.1+3}{4} = 1.75$

$50 = Pe^{0.03 \cdot 1.75}$

now we don't "hit it with a log" because what we are looking for is not in the exponent.

$\frac{50}{e^{0.0525}} = \frac{Pe^{0.0525}}{e^{0.0525}}$

$P = \frac{50}{e^{0.0525}} = \$47.44$

↓

calculator