**Patterns in Logs**

*Monday November 22 2010*

1. *log*31= 0

*log*271=0

General Case: *log*61= 0

1. log775=5

log222217= 17

(in this particular case we can “cross out” the 22’s or 7’s)

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| Example: Suppose you invest $100 in an account that pays 5% interest compounded annually. The amount *A* in dollars is given by: A= 100(1.05)t *When does the amount double*? | | |
| 200= 100(1.05)t  2=(1.05)t  log1.052= t  ***This is as far as we can go! We need a new stradegy! →*** | The Power Law of Logarithms  **loga(xn) = nlogax**  eg. log394  =4log39  (log39 → 3x=9, x=2)  = 4(2)  = 8  Eg. log285  =5log28  =5(3)  =15 | So, how do we solve 2=1.05t?  log2=log1.05t  *apply power law of logarithms*  log2= t log 1.05  *divide both sides my log1.05*  *→ (you can use a calculator, base 10)*  *t= 14.2* |

General Case: **Change of Base Formula**

x=logbm

bx=m

logbx=logm

x=

**Product and Quotient Laws**

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| **Product Rule:** logbmn = logbm + logbn  Eg. log56 + log58  = log548 | **The Quotient Rule:** logb() = logbm - logbn |

Examples: solve

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| --- | --- | --- |
| log56 + log58 – log516  = log548 – log516  =log5(48/16)  =log53 | 2log5 + 1/2log16  = log52 + log161/2  =log25 + log 4  =2 | log(2x-2) – log(x2-1)  = log(2x-2)/ (x2-1)  = log2/(x+1)  Where x+1 cannot be 0  X cannot be -1, 1 |