

Quantitative Methods:

Exercises Set 2

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1. Where possible, evaluate or simplify using the laws of logarithms.

a) $\log_a (2xy)$

b) $\log_a (x^2 y^3 / z^4)$

c) $\log_a (2x + y)$

d) $\log_a (x^a)$

e) $\log_a (a^2 x^3 / 3)$

f) $\log_b [P(1+r)^t]$

g) $\ln (100e^{-0.01t})$

h) $\log_{10} (67 * 10^{-0.12x})$

2. Solve for x:

a) $(.58)^x = 5.67$

b) $e^{3x} = 403.43$

c) $4 \ln x - 10 = 0$

d) $3e^{x-4} = 24$

e) $\ln(x+6) - \ln(x-3) = 1$

3. In 2003, Russian President Vladimir Putin requested the government to double its Gross Domestic Product (GDP) by 2010 (i.e., in 7 years).

Assuming an exponential growth at a constant rate over the time span 2003-2010, find the required yearly growth rate.

4. Banana Computers has just launched a new computer. They assume that sales (S) in the first 5 weeks will grow exponentially:

$$S(t) = e^{2t-0.2t^2} \text{ for } 0 < t < 5$$

Where sales are measured in thousands and t is measured in weeks.

The company wants to know after how many weeks will sales reach 20 thousands units.

- 5. How long will it take money to double if it is invested at 20% compounded annually?**

- 6. How long will it take money to triple at 10% interest compounded continuously?**

- 7. Given that the membership of a political party was 3.64 million in 1985 and 5.82 million in 1990, express the membership as a natural exponential function of time ($M = M_0 e^{rt}$). At what rate is the membership growing?**