Quantitative Methods:

Exercises Set 2

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These exercises were prepared by Michèle Hibon, Emeritus Lecturer, and Ilia Tsetlin, Associate Professor of Decision Sciences, both at INSEAD.

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

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) $4\ 1\text{n}\, x - 10 = 0$

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:

$S(t) = e^{2t-0.2t^2}$ 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 ($M = M_o e^{rt}$). At what rate is the membership growing?**