

Problems | Name: _____

2.1 Constant Ratios and Model Choice

2.1.1. At inputs 0, 1, 2, 3, outputs are 2, 6, 18, 54. Give a model and predict the next output.

2.1.2. At inputs 0, 2, 4, outputs are 4, 16, 64. What is the per-unit growth factor?

2.1.3. Why do outputs 1, 2, 4 at inputs 0, 1, 3 not establish a constant per-unit factor?

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2.2 Growth and Decay Factors

2.2.1. An initial amount of 100 grows by 10% per year. Find the amount after three years.

2.2.2. A model is $P(t) = 80(0.93)^t$. State the percent change each time unit.

2.2.3. Why does increasing by 20% and then decreasing by 20% not restore the original value?

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2.3 Rescaling the Exponent

2.3.1. A quantity starts at 12 and triples every 2 days. Find its value after 4 days.

2.3.2. Rewrite $100 \cdot 4^{t/2}$ using a per-unit base.

2.3.3. A model uses t in years: $P(t) = 50(1.08)^t$. Rewrite using months m .

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2.4 Logarithms as Inverses

2.4.1. Evaluate $\log_5(1/25)$.

2.4.2. State the domain of $g(x) = \ln(x - 4)$.

2.4.3. Solve $\log_3 x = 4$.

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2.5 Logarithm Properties

2.5.1. Condense $\log_2 x + \log_2 (x - 1)$ and state the original domain.

2.5.2. Evaluate $\log_3 (1/27)$.

2.5.3. Is $\ln(x + 2) = \ln x + \ln 2$ a valid identity for $x > 0$?

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2.6 Solving Exponential and Logarithmic Equations

2.6.1. Solve $3^{2x} = 27$.

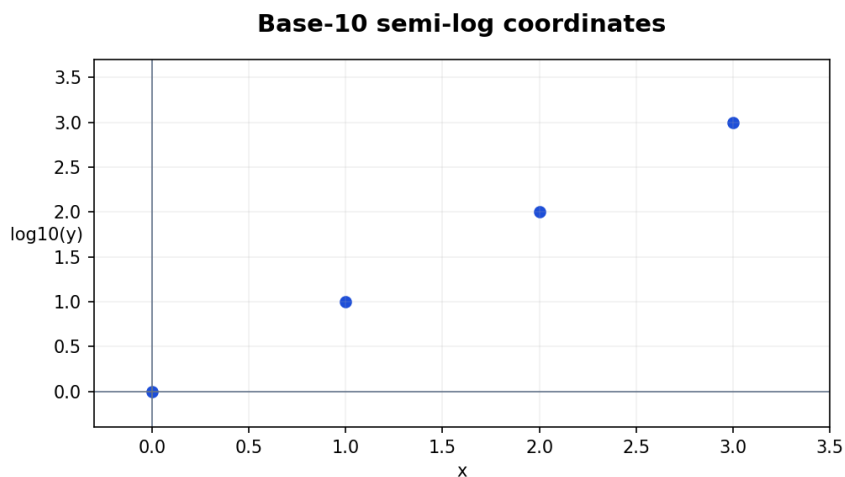
2.6.2. Solve $\log_2(x - 3) = 4$.

2.6.3. Solve $\ln x + \ln(x - 3) = \ln 4$ and reject invalid candidates.

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2.7 Semi-Log Plots

2.7.1. At inputs 0, 1, 2, 3, outputs are 1, 10, 100, 1000. Find their base-10 logs and describe the semi-log pattern.



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The original outputs are 1, 10, 100, and 1000.

2.7.2. Can a real semi-log plot use an output of 0?

2.7.3. If $\ln y = 3 - 0.2x$, find the per-unit factor in the original model.