

All work must be shown neatly on separate graph paper. Write the problem down first.

29 pts

8.1 Exponential Growth

Graph the function. Then state the domain and range.

① $y = -2^x - 1$ Clearly show all asymptotes with a dashed line.

② $y = 3^{x+1} + 2$

③ You deposit \$1000 in an account that earns 2.5% annual interest. Find the balance after 3 years if interest is compounded: (a) quarterly (b) daily

8.2 Exponential Decay

Graph the function. Then state the domain and range.

④ $y = -\left(\frac{1}{2}\right)^x - 2$ Clearly show all asymptotes with a dashed line.

⑤ $y = 2\left(\frac{1}{2}\right)^x + 3$

⑥ A tool and die business purchases a piece of equipment for \$250,000. The value depreciates at a rate of 12% per year. Write a model for the value of the equipment. Estimate the value after 5 years.

8.3 The Number e

⑦ Explain how the number e was discovered using the compound interest formula

Simplify the expression.

⑧ $e^{2x} \cdot e^{1-2x}$ ⑩ $\left(\frac{e}{2}\right)^{-1}$

⑨ $\frac{e}{e^{x+1}}$

⑪ $\sqrt{64e^{4x}}$

⑫ Solve the compound interest problem above (8.1) for continuous compounding.

8.4 Logarithmic Functions

Graph the function. Then state the domain and range.

⑬ $f(x) = -\log_3(x-1) + 1$ Clearly show asymptotes with a dashed line.

⑭ $f(x) = \log_6(x+1)$

Evaluate without using a calculator.

⑮ $\log_{27} \frac{1}{9}$ ⑰ $\log_3 1$

⑱ $\log_{1/2} 4$ ⑲ $\ln e^{1/2}$

8.5 Properties of Logarithms

Use the properties of logarithms to rewrite the expressions in terms of $\log 3$ and $\log 4$. Then use $\log 3 \approx 0.477$ and $\log 4 \approx 0.602$ to approximate the expression. Show all steps

(19) $\log\left(\frac{4}{27}\right)$

Expand:
(21) $\log \frac{x^2}{4}$

(20) $\log 12$

Condense:
(22) $\log_3 4 + 2\log_3 x - \log_3 5$

(23) Use the change of base formula to evaluate the expression:

$\log_{0.8} 12$

8.6 Solving Exponential and Logarithmic Equations

Solve. Then check for extraneous solutions.

(24) $4^{-2x} - 3 = 1$ (25) $e^{4x} - 3 = 7$ (26) $\log(x^2 - 1) = \log(x + 5)$ (27) $2e^{4x} = 5$

8.7 Modeling with Exponential and Power Functions

(28) Write an exponential function of the form $y = ab^x$ whose graph passes through $(2, \frac{3}{4})$ and $(3, \frac{3}{8})$

(29) Write a power function of the form $y = ax^b$ whose graph passes through:
 $(2, 64)$ and $(3, 486)$