Instructions

Solve the following problems related to exponential functions. Show all steps clearly, and simplify your answers as much as possible.

Problems

Problem 1

Solve the exponential equation for x:

$$2^x = 16$$

Problem 2

Simplify the following exponential expression:

$$3^x \cdot 3^{2x}$$

Problem 3

Solve the exponential equation for x:

$$5^{2x} = 125$$

Problem 4

Express the following exponential expression as a single exponent:

$$2^{x+1} \cdot 2^{2x}$$

Problem 5

The population of a certain species of bacteria doubles every 3 hours. If the initial population is 500, find the population after 9 hours.

Problem 6

Solve the exponential equation for x:

$$e^{2x} = e^5$$

Problem 7

Simplify the following expression using the properties of exponents:

$$\left(3^{x+1}\right)^2$$

Problem 8

The half-life of a radioactive substance is 6 years. If the initial amount is 100 grams, how much remains after 18 years?

Problem 9

Express the following exponential expression in logarithmic form:

$$7^x = 49$$

Problem 10

Solve the exponential equation for x:

$$10^{2x+1} = 1000$$