Euclid Preparation 1

Logarithms, Exponents, Functions, and Equations

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Part I

Logarithms and Exponents

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Exponents review

When $a, b, x, y \in \mathbb{R}$ and $n \in \mathbb{R} \mid n \neq 0$:

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$a^0 = 1 \text{ if } a \neq 0$$

$$a^{-x} = \frac{1}{a^x} \text{ if } a \neq 0$$

$$\frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x \text{ if } b \neq 0$$

0^0 is not defined.

$$\frac{a^x}{a^y} = a^{x-y} \text{ if } a \neq 0$$

$$(a^x)^y = a^{xy}$$

$$a^x \cdot b^x = (ab)^x$$

$$a^x a^y = a^{x+y}$$

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Exponents examples

Problem

If m and k are integers, find all solutions to the equation:

$$9(7^k + k^{k+2}) = 5^{m+3} + 5^m$$

Exponents problem 1

Exponents examples

Problem

If m and k are integers, find all solutions to the equation:

$$9(7^k + k^{k+2}) = 5^{m+3} + 5^m$$

Solution

$$9(1 + 7^2)k^2 = 5^m(5^3 + 1)$$

1 Exponents review

2 Exponents examples