

Answer on Question #84734 – Math – Algebra

Question

The following proof seems to show that $1 = 2$ explain the error clearly

$$\begin{aligned}a &= b \\a^2 &= ab \\a^2 - b^2 &= ab - b^2 \\(a - b)(a + b) &= b(a - b) \\a + b &= b \\b + b &= b \\2b &= b \\2 &= 1\end{aligned}$$

Solution

If $a = b$ then:

$$a^2 = ab \text{ this equation is true}$$

$$a^2 - b^2 = ab - b^2 \text{ this equation is true}$$

$$(a - b)(a + b) = b(a - b) \text{ this equation is true}$$

$$(a - b)(a + b) = b(a - b)$$

$$\frac{(a - b)(a + b)}{(a - b)} = \frac{b(a - b)}{(a - b)}$$

$$a - b = a - a = 0. \text{ Impossible to divide by zero!!! (it is the main error)}$$

$$a + b = b$$

$$a + b = b \text{ this equation is false!}$$

$$b + b = b$$

$$2b = b$$

$$2 = 1$$

Answer: the main error was a division by zero.