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HW#5



Yes. The right-hand side of this equation is rational.

Suppose n is any non-negative integer.

We know that

⬄

Let and , then p and q are integers, because n is a non-negative integer and .

for some integers p and q, with

is a rational number.

We know that since c satisfies a polynomial equation of the form

Thus, c is a real number such that

Where are rational numbers.

Therefore, we have:

()

Substitute to the original equation, we have:

⬄

Let

Since , we know that are all integers.

Hence, c satisfies the equation ( are integers)

Thus, the statement is proved true.



We have the numbers as follow: 72, 21, 15, 36, 69, 81, 9, 27, 42, and 63.

It is noticeable that all numbers above is divisible by 3.

We know that if a|3 and b|3, a+b | 3

However, 100 | 3 is false. Therefore, any number of those numbers will add up and cannot reach exactly 100. Their sum cannot be equal to 100. Thus, no customer will win $100.



Let x and y be the number of mathematics and CS students respectively. We know that:

and

The objective is to find the minimum x and y that satisfy the statement above.

⬄ 10x = 9y

We know that 9y divides 9, and 10x divides 10. Following to the equation above, 10x divides 9.

Since 10 does not divide 9, x needs to divide 9.

And we know that , thus x = 108

Therefore, there are 108 mathematics students and 120 CS students.