Answer on Question #55965 – Math – Algebra

The numerator of a fraction is one less than its denominator. If 3 is added to each of its numerator and denominator then the fraction is increased by 3/28. Find the fraction.

Solution

Let the denominator be x, then numerator will be $(x-1)$. We have a fraction $\frac{x-1}{x}$.

Now adding 3 to the numerator and denominator: $\frac{x+2}{x+3}$.

Then we can write the equation:

$\frac{x+2}{x+3}-\frac{x-1}{x}=\frac{3}{28}$.

We reduce the left-hand side of the equation to the common denominator:

$\frac{x^2+2x-x^2-3x+x+3}{x(x+3)}=\frac{3}{28}$;

Simplify

$\frac{3}{x(x+3)}=\frac{3}{28}$.

We come to the quadratic equation:

$x^2+3x-28=0$.

From Viet's formulae we have

$x_1+x_2=-3, x_1\cdot x_2=-28$.

Trying different values of x_1, x_2 we find that

$x_1=4, x_2=-7$.

If $x_1=4$ then the fraction is $\frac{3}{4}$, which meets the requirement that the numerator is less than the denominator.

If $x_2=-7$ then the fraction is $\frac{-8}{-7}=\frac{8}{7}$. We see that this fraction doesn't satisfy condition, because in this case the numerator is not less than the denominator.

Answer: $\frac{3}{4}$.