Daniel Meyer

CSIS 213-3941

Assignment 7&8 Quiz Part 2

**Question 4**

Prove this statement by mathematical induction.

https://msjc.instructure.com/assessment_questions/507251/files/89442/download?verifier=MEU1nZHJbpXeYO0oNRaDLAeMRXFLPc6q7CXjtYAu

**Proof:**

Let the property P(n) be the equation

https://msjc.instructure.com/assessment_questions/507251/files/89442/download?verifier=MEU1nZHJbpXeYO0oNRaDLAeMRXFLPc6q7CXjtYAu

***Show that P(1) is true:***

To establish P(1), we must show that

1 / (1\*2) = 1/1(1 + 1)

But the left-hand side of this equation is ½ and the right-hand side is

1/1(2) = ½

Also. Hence P(1) is true.

***Show that for all integers K>= 1, if P(k) is true then P(k+1) is also true:***

*[Suppose that P(k) is true for a particular but arbitrarily chosen integer k >= 1.]*

Suppose that k is any integer with k >= 1 such that

1/(1\*2) + 1/(2\*3) + …. + 1/k(k + 1) = k / (k+1)

We must show that

1/(1\*2) + 1/(2\*3) + …. + 1/(k+1)[(k + 1) + 1] = (k+1) / [(k+1) +1]

or equivalently, that

1/(1\*2) + 1/(2\*3) + …. + 1/(k+1)(k+2) = (k+1)/(k+2)

The left-hand side of P(k+1) is

1/(1\*2) + 1/(2\*3) + …. + 1/(k+1)(k+2)

= 1/(1\*2) + 1/(2\*3) + …. + 1/k(k + 1) + 1/(k+1)(k+2)

= k/(k+1) + 1/(k+1)(k+2)

= k(k+2)/(k+1)(k+2) + 1/(k+1)(k+2)

= k(k+2) + 1/(k+1)(k+2)

= (k+1)/(k+2)

Thus the two sides of P(k+1) are equal to the same quantity and so they are equal to each other. Therefore the equation P(k+1) is true.