Preparation Activity PA01 – Proof by Induction

During the development of a software application, the software team started to note that the size of one of the data structures increases according to the value of an integer positive variable n in the following way:

$$\left(1+\frac{3}{1}\right)\left(1+\frac{5}{4}\right)\left(1+\frac{7}{9}\right)\ldots(1+\frac{(2n+1)}{n^2})$$

The developers consider that the equation that models the size of the data structure is based on:

$$(n+1)^2$$

They need now to prove the validity of this equation as they intend that the software application provides certain decisions based on the value of n.

Prove by using the induction method the following equation and considering $n \geq 1$.

$$\left(1+\frac{3}{1}\right)\left(1+\frac{5}{4}\right)\left(1+\frac{7}{9}\right)\ldots\left(1+\frac{(2n+1)}{n^2}\right)=(n+1)^2$$