Induction – Q11 [Practice/E] (18/6/23)

$\sum_{r=1}^{n} r(r!) = (n+1)! - 1$

Solution

[Show that the result is true for $n = 1$]

Now assume that the result is true for $n = k$, so that

$\sum_{r=1}^{k} r(r!) = (k+1)! - 1$

Then $\sum_{r=1}^{k+1} r(r!) = (k+1)! - 1 + (k+1)(k+1)!$

$= (k+1)!\,(k+2) - 1 = (k+2)! - 1$

$= ([k+1]+1)! - 1$

[Standard wording]