Homework I

Marko Taleski 89201031

A

Prove: $1\cdot 2+2\cdot 3+\dots+n\cdot(n+1)=\frac{n\cdot(n+1)(n+2)}{3}$

we start of with P_0: $0\cdot(0+1)=\frac{0\cdot(0+1)(0+2)}{3}$

$$0\cdot 1=\frac{0\cdot 1\cdot 2}{3}$$

$$0=0$$

Now we continue with proving P_1 to be true

$$P_1:\ 1\cdot(1+1)=\frac{1\cdot(1+1)(1+2)}{3}$$

$$1\cdot 2=\frac{1\cdot 2\cdot \cancel{3}}{\cancel{3}}$$

$$2=2$$

And lostly we prove that P_{n+1} to be true

$$P_{n+1}:\ 1\cdot 2+2\cdot 3+\dots+n\cdot(n+1)+(n+1)\cdot(n+2)=$$

$$=\frac{n\cdot(n+1)(n+2)}{3}+(n+1)(n+2)$$

$$1\cdot 2+2\cdot 3+\dots+n(n+1)+(n+1)(n+2)=\left(\frac{n}{3}+1\right)(n+1)(n+2)$$

$$=\frac{(n+1)(n+2)(n+3)}{3}$$

With proving that P_0, P_1, P_{n+1} to be true, we prove that the proposition is true