CS220 Fall 2018 Written Homework 1: Induction

name:

eid:

(Please complete on this template or transfer your answer to this template. Notebook paper will not be accepted!)

1. Prove using induction that the predicate P(n): 1*1! + 2*2! + ... +n*n! = (n+1)! - 1 is true for any positive integer n.

a) Show that P(1) is true, completing the base of the induction.

b) What do you need to prove in the inductive step? Write out P(k) →P(k+1) for this particular case.

c) Complete the inductive step.

2a) Find a formula for $\frac{1}{1*2}+\frac{1}{2*3}+\ldots+\frac{1}{n*(n+1)}$ by examining the values of this expression for small values of n.

2b) Prove the formula you found by induction. Follow the format of question 1.