

Turn this assignment in electronically using the Curator system. No late assignments will be accepted.

1. [10 points] Simplify the following summations. Assume that k is a constant.

a. $2 + \sum_{i=1}^n 3$

b. $\sum_{i=1}^n (5n + 2)$

c. $\sum_{i=1}^n 4i$

d. $\sum_{i=0}^{n+1} 3$

e. $\sum_{i=1}^n \left(\sum_{j=i+1}^n 8 \right)$

f. $\sum_{i=1}^k 4n$

For the next two problems, use the proof format shown below. In the first line, indicate what type of induction you are using (either weak or strong). Note that in order to receive full credit, you must use your inductive assumption when “showing” what you “need to show”. You must also show that your base case(s) are true. Be sure to give justifications for all steps.

Proof using (weak | strong) induction:

- a) Let S be the set of all integers $N > 0$ such that:
 - b) Base case(s):
 - c) Inductive Assumption:
 - d) Need to show that:
 - e) Show:
 - f) Therefore:
2. [10 points] Use mathematical induction to prove that for all integers $N > 0$, the integer $2*N$ is even. For the purposes of this problem, an integer I is even if $I \bmod 2 = 0$. You may use the mathematical property that the sum of two even numbers is an even number.

3. [10 points] Use mathematical induction to prove that for all integers $n > 0$, $\sum_{i=1}^n i = \frac{n(n+1)}{2}$