**CISC 233 Essential Algorithms HW 1**

Solve the following problems. Submit a Word or PDF document named yourlastname.docx or yourlastname.pdf.

**Task 1.** Evaluate the following Summation Notation. To receive full credit, you must show your work step by step.

A picture containing schematic

Description automatically generated

**Task 2.** For each positive integer n, let P(n) be the formula:

1. Write P(1)

P(1) =

1. Write P(k)

P(k) =

1. Write P(k+1)

P(k+1) =

1. In a proof by mathematical induction that the formula holds for all integers n ≥ 1, what must be shown in the inductive step?

**Task 3.** Use Mathematical Induction to show that any amount of money of at least 14¢ can be made up using 3¢ and 8¢ coins.

**Task 4.** Use Mathematical Induction to show that any postage of at least 12¢ can be made up using 3¢ and 7¢ stamps

**Task 5**. Prove the following statement by mathematical induction

**Task 6.** Given a while loop and a predicate, show that if the predicate is true before entry to the loop, then it is also true after exit from the loop.

***Algorithm 1***

predicate: m+n is odd

while (m≥0 and m≤100):

m = m + 4

n = n - 2

**Task 7.** Given a while loop and a predicate, show that if the predicate is true before entry to the loop, then it is also true after exit from the loop.

***Algorithm 2***

predicate: m3 ≥ n2

while (m≥0 and m≤100):

m = 3\*m

n = 5\*n