CISC-102 FALL 2018

HOMEWORK 3

Please work on these problems and be prepared tor solutions in class next Thursday. Assignments will **not** be collected for grading.

Readings

Read sections 1.8 of *Schaum's Outline of Discrete Mathematics.*
Read section 2.1 of *Discrete Mathematics Elementary and Beyond.*

Problems

(1) Prove using mathematical induction that the sum of the first n natural numbers is equal to $\frac{n(n+1)}{2}$. This can also be stated as:
Prove that the proposition P(n),

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

is true for all $n \in \mathbb{N}$

(2) Prove using mathematical induction that the proposition P(n),

$$\sum_{i=2}^{n} i = \frac{(n-1)(n+2)}{2}$$

is true for all $n \in \mathbb{N}$

(3) Prove using mathematical induction that the proposition P(n),

$$\sum_{i=3}^{n} i = \frac{(n-2)(n+3)}{2}$$

is true for all $n \in \mathbb{N}$

(4) Prove using mathematical induction that the proposition P(n)

$$n! \leq n^n$$

is true for all $n \in \mathbb{N}$.