

## 2) (10 pts) ANL (Summations and Algorithm Analysis)

Find the closed form solution in terms of  $n$  for the following summation. Be sure to show all your work.

$$\begin{aligned}
 & \sum_{i=n}^{3n} \sum_{j=1}^{n-2} j \\
 &= \sum_{i=n}^{3n} \frac{(n-2)(n-1)}{2} \\
 &= \frac{(3n-n+1)(n-2)(n-1)}{2} \\
 &= \frac{(2n+1)(n-2)(n-1)}{2}
 \end{aligned}$$

In the second step, we are summing a constant with respect to the summation index  $i$ , thus we can simply multiply the item being summed by the number of times it's summed.

Note, also accepted is the polynomial multiplied out:

$$= \frac{2n^3 - 5n^2 + n + 2}{2}$$

Grading: 5 pts for solving the inner summation, 5 pts for then solving the outer summation, grader decides partial credit within each part.