2) (10 pts) ANL (Summations)

a) (5 pts) Determine the value of the following summation, in terms of *n*: $\sum_{i=1}^{2n}(4i+7)$. Express your final answer as a polynomial in the form $an^2 + bn$, where a and b are integers.

$$\sum_{i=1}^{2n}(4i+7) = \left(4\sum_{i=1}^{2n} i\right) + \sum_{i=1}^{2n} 7$$
$$= 4 \times \frac{2n(2n+1)}{2} + 7(2n)$$
$$= 2(2n)(2n+1) + 14n$$
$$= 8n^2 + 4n + 14n$$
$$= 8n^2 + 18n$$

Grading: 1 pt for split, 2 pts for sum to i formula, 1 pt sum constant, 1 pt simplify

b) (5 pts) Determine the value of the summation below:

$\sum_{i=21}^{100}(3i+1) = \sum_{i=1}^{100}(3i+1) - \sum_{i=1}^{20}(3i+1)$

$= \sum_{i=1}^{100}(3i) + \sum_{i=1}^{100} 1 - (\sum_{i=1}^{20}(3i) + \sum_{i=1}^{20} 1)$

$= 3 \times \frac{100\times101}{2} + 100 - (3 \times \frac{20\times21}{2} + 20)$

$= 3 \times 50 \times 101 + 100 - 3 \times 10 \times 21 - 20$

$= 3 \times 5050 + 100 - 30 \times 21 - 20$

$= 15150 + 100 - 630 - 20$

$= 14600$

Grading (5 pts total): 1 pt for splitting sum, 3 pts for properly plugging into formulas for both sums, 1 pt for simplification