3) (10 pts) ANL (Recurrence Relations)

Determine the following summation in terms of n, **in factorized form**. (Do NOT multiply the answer out into polynomial form. Note: Your answer should NOT have a fraction in it.)

$$\sum_{i=1}^{2n-1} (i + 3i^2)$$

$$\sum_{i=1}^{2n-1} (i + 3i^2) = \left(\sum_{i=1}^{2n-1} i\right) + \left(\sum_{i=1}^{2n-1} 3i^2\right)$$

$$= \frac{(2n-1)(2n)}{2} + \frac{3(2n-1)(2n)(2(2n-1)+1)}{6}$$

$$= n(2n-1) + \frac{3(2n-1)(2n)(4n-2+1)}{6}$$

$$= n(2n-1) + (2n-1)(n)(4n-1)$$

$$= n(2n-1)(1+4n-1)$$

$$= n(2n-1)(4n)$$

$$= \mathbf{4n^2(2n-1)}$$

Grading: 1 pt split sum
2 pts formula sum of i
2 pts formula sum of i^2
2 pts to get to non-fractional form (canceling 2, 6)
2 pts factor out n(2n – 1)
1 pt to simplify to final form
Note: Grade was 7 pts out of 10 for polynomial form.