Recurrence Relations and Summations (solve on your own paper)

Find the closed form solution for the following recurrence relations using the iteration technique:

1) $T(n) = 2T\left(\frac{n}{2}\right) + 1, T(1) = 1$

2) $T(n) = T(n-1) + n, T(1) = 1$

3) $T(n) = T\left(\frac{n}{2}\right) + n, T(1) = 1$, Hint: $\sum_{i=0}^{\infty} \frac{n}{2^i} = 2n$ (Just get an approximate solution here.)

4) $T(n) = 4T\left(\frac{n}{2}\right) + 1, T(1) = 1$, Hint: $\sum_{i=0}^{k-1} 4^i = \frac{4^k - 1}{4 - 1}$

Find a closed form solution in terms of n (and perhaps m) for each of the summations below.

5) $\sum_{k=5}^{2n} (3k - 2)$

6) $\sum_{i=0}^{n} \left(2 \sum_{j=n+1}^{3n} (i + j) \right)$

7) $\sum_{j=1}^{2n} \sum_{m=12}^{3j+5} 2$

8) $\sum_{i=1}^{n+5} \sum_{j=1}^{m} ij$