**Section A:** Solve the following recurrence:

Tn = 3Tn-1 + 2

Subject to T1 = 1

Tn = 3(3Tn-2 + 2) + 2 = 32Tn-2 + 3x2 + 2

Tn = 32(3Tn-3 + 2) + 3x2 + 2 = 33Tn-3+32x2 + 3x2 + 2

In general:

Tn = 3kTn-k + 3k-12 + 3k-22 + … + 312 + 302

Tn = 3kTn-k + (3k-1 + 3k-2 + … + 31 + 30)2

Tn = 3kTn-k + 2(3k-1) / (3-1) = 3kTn-k + 3k-1

For the base case n-k = 1, or k = n – 1, which gives:

Tn = 3n-1T1 + 3n- 1 = 3n-1T1 + 3n

**Section B:** Solve the following recurrence:

Sn = 2Sn-1

subject to S1 = 1

Sn = 2(2Sn-2) =22Sn-2

Sn = 22(2Sn-3) = 23Sn-3

In general:

Sn = 2kSn-k

For the base case n – k = 1, or k = n – 1

Sn = 2n – 1 S1 = 2n-1