CSCA67 Exer

(1). CACG does not end with T, it must appear at the end
There are 12 positions to consider
1st way: Place 2 T first, followed by 3 ATs. then ≥ AGCTs.
     1AGT, 1 GGT, 1AGACAT, 1AAGAT, 1 AGGCT.
     $C(12,2) \cdot C(10,3) \cdot c(7,2) \cdot c(5,1) \cdot c(4,1) \cdot c(3,1) \cdot c(2,1) \cdot c(1,1)$
     = 19958400

2nd way: Place 3 ATs, followed by ≥ AGCTS, ≥Ts.
     1AGT, 1 GGT, 1AGACAT, 1AAGAT, 1AGGCT.
     $c(12,3) \cdot c(9,2) \cdot c(7,2) \cdot c(5,1) \cdot c(4,1) \cdot c(3,1) \cdot c(2,1) \cdot c(1,1)$
     = 19958400

3rd way) Place 2AGCTs, followed by ≥ Ts, 3 ATs.
     1AGT, 1GGT, 1AGACAT, 1AAGAT, 1AGGCT
     $C(12,2) \cdot c(10,2) \cdot c(8,3) \cdot c(5,1) \cdot c(4,1) \cdot c(3,1) \cdot c(2,1) \cdot c(1,1)$
     = 19958400

The counts are equivalent.
There are C(

(2) A1: Liberals $A_1 + A_2 + A_3 + A_4 = 24$
     A2: Conservatives
                           ↓ at least 7 A₁, 2A₂, 1A₃, 1A₄
     A3: New Democrat
                           $A_1 + A_2 + A_3 + A_4 = 13$
     A4: Green.

     $\binom{13+4-1}{13}$ = 760 ways.

③. 24 donuts.

X_i will be the variety for each i $1 \leq i \leq 6$.

$X_1 + X_2 + \cdots + X_6 = 24$

↓ at least one

$X_1 + X_2 + \cdots + X_6 = 18$

$\binom{18+6-1}{18} = 33649$ ways.

④ A_1: apple $A_1 + A_2 + A_3 + A_4 = 10$

A_2: orange

A_3: pears   ↓ at leas $\geq A_2, 1 A_1$

A_4: bananas $A_1 + A_2 + A_3 + A_4 = 7$.

$\binom{7+4-1}{7} = 120$ ways.