Team Round – continued

F) Alternate solution (Tuan Le) - 3 cases
Case 1: 2Ps are next to each other, but O and I are not
PP, L and N create 4 spaces to place the remaining letters.
{ ___ PP ___ L ___ N ___}
The PP, L and N can be arranged in 3! = 6 ways and there are 4·3 = 12 ways to place the O and I
➔ 6·12 = 72

Case 2: OI are next to each other, but the Ps are not
Again OI, L and N create 4 spaces to place the remaining letters.
{___ OI ___ L ___ N ___}
Arrange OI next to each other – 2 ways
Arrange OI, L and N – 6 ways

Use 2 of the 4 spaces for the Ps - $\binom{4}{2} = \frac{4!}{2!2!} = 6$

➔ 2(6)(6) = 72

Case 3: Both OI and PP in adjacent positions
Arrange the 4 items. Only OI can be flipped.
{OI, PP, L, N} ➔ 4!·2! = 48
Since the total number of anagrams is 6! – 1 = 359, the number of anagrams without adjacent Ps
and without adjacent vowels is 359 – (2(72) + 48) = **167**.