Larri Miller – worked with Grace and Maddi

DACCS 603

HW # 5

Due 10/11

1. The sample space consists of all of the 187 nations eligible for selection. {Nation1, Nation2, … Nation187}
2. The union of A, P, L, W, and E represents the ability to choose any of the 187 nations, as there are only 5 possible groups (events) that the nations could be a part of. Because this encompasses the sample space, P(Ω) = 1.
3. (A ∪ P ∪ L)C means the complement, or probability of *not* (A ∪ P ∪ L). It is equivalent to 1 – P(A ∪ P ∪ L).
4. It is assumed that each nation only belongs to one group, thus, all of the events are mutually exclusive. A nation can not be in both the A and L group, leading P(A ∪ L) to equal **0**.
5. WEOG (W) has 26 members and EEG (E) has 22. Thus, P(W) = 26/187 and P(E) = 22/187. The probability of choosing a state from either is represented as P(W ∪ E); P(W ∪ E) = P(W) + P(E) – P(W ∩ E). Because we are assuming that the event of choosing W or E is mutually exclusive, the value of P(W ∩ E) is 0. (26/187) + (22/187) = **0.257**
6. Assuming that there is no difference between seats, this is a combination, calculated by n!/r!(n-r)!. Because there are 33 nations in GRULAC and only 2 will be selected, n = 33 and r = 2. 33! / (2! \* (33-2)!) = 33!/(2!\*31!) = **528**.
7. The African group has 54 members and the Asia-Pacific group has 52. We need to multiply the two combinations together to find the different ways that 5 seats can be filled, therefore: 54C3 \* 52C2 = (54!/3!\*(54-3)!) \* (52!/2!\*(52-2)!) = **32,890,104**
8. Because we have calculated the African and Asia-Pacific groups in (g) and GRULAC in (f), we can calculate the combination values for WEOG and EEG and multiply it by the values we already have. 26C2 (WEOG) + 22C1 (EEG) = (26!/2!\*(26-2)!) \* (22!/1!(22-1)!) = 7,150. In total, 528 (GRULAC) \* 32,890,104 (African + Asia-Pacific) \* 7,150 (WEOG + EEG) = **1.24 x 1014 total combinations**
9. Because order matters, this is a permutation, where n = 15 (members of the security council) and r = 4 (individual timeslots). 15P4 = 15!/(15-4)! = 15!/11! = **32,760**
10. This is a combination in which Africa is not included, meaning that there are a total of 12 options available.  12C4 = 495. To calculate the probability, we need to divide this value by all the possible combinations, including Africa: 15C4 = 1365. 495/1365 = **0.363**
11. For this problem, it is assumed that a non-permanent member can have either 0, 1, or 2 slots. We can calculate for if the non-permanent member has 0 slots and take the complement for a non-permanent member having *not* 0, or at least 1, slots. The probability of a non-permanent member having 0 slots is 3C2/ 13C2, because there are 3 possible permanent members of a total of 13 nations total to be selected for the remaining two slots. The probability of at least one of the remaining slots going to a non-permanent member of the Security Council = 1 – (3C2/ 13C2) = **0.962**.