

Question 1

- a)  $ENG \cap F^c$
- b)  $E \cup G \cup F$
- c)  $(ENG) \cup (GNF) \cup (ENF)$
- d)  $E^c \cap G^c \cap F^c$
- e)  ~~$(ENG \cap F) \cup (GNF \cap F) \cup (ENF \cap F)$~~   $(ENF \cap G)^c$

Question 2

- a)  $(4/15 \cdot 3/14) + (11/15 \cdot 4/14) = 4/15$
- b)  $\binom{4}{1} \binom{5}{1} \binom{6}{1} / \binom{15}{3} = 120/455 = 24/91$
- c)  $(5/15 \cdot 4/14 \cdot 6/13) + (6/15 \cdot 4/14 \cdot 5/13) = 8/91$
- d)  $P(A) + P(B) - P(A \cap B) = 4/15 + 24/91 - 8/91 = 604/1365$
- e)  $\binom{11}{3} / \binom{15}{3} = 33/91 \rightarrow 1 - 33/91 = 58/91$

Question 3

- a)  $5/6 \cdot 4/6 \cdot 3/6 \cdot 2/6 = 5!/6^4 = 5/54$
- b)  $6 \binom{5}{3} \binom{5}{1} / 2! = 6 \cdot 10 \cdot 60 = 3600 \rightarrow 3600/6^5 = 25/54$

Question 4

~~$$\frac{9 \cdot 11 \cdot 13 \cdot 15}{4 \cdot 12 \cdot 14 \cdot 16} \cdot \frac{10 \cdot 12 \cdot 14 \cdot 16}{11 \cdot 13 \cdot 15 \cdot 17} \cdot \frac{12 \cdot 14 \cdot 16 \cdot 18}{13 \cdot 15 \cdot 17 \cdot 19} \cdot \frac{14 \cdot 16 \cdot 18 \cdot 20}{15 \cdot 17 \cdot 19 \cdot 21} \approx 0.519$$~~

$$\binom{15}{4} \cdot \binom{10}{5} \cdot 9! \cdot \binom{11}{1} \times 15! / (25!) \approx 0.1158$$

Question 5

$N!$  is the total number of arrangements  
 we make AB a block and there are two ways to arrange  
 so we get  $2(N-1)!/N! = 2/N$