

Question 1

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

Question 3

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

Question 4

$$\binom{9}{4} \binom{15}{5} 5 / \binom{25}{10} = \frac{1,892,890}{3,768,760} \approx 0.579$$

Question 5

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