Question 1

(a) $E \cap G \cap F^c$

(b) $E \cup G \cup F$

(c) $(E \cap G) \cup (G \cap F) \cup (E \cap F)$

(d) $E^c \cap G^c \cap F^c$

(e) $(E \cap F \cap G)^c$

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) $6\binom{5}{3}(5!/2!) = 6 \cdot 10 \cdot 60 = 3600 \rightarrow 3600/6^5 = 25/54$

Question 4

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

Question 5

$N!$ is the total number of arrangements

we make AB a block and there are two ways to arrange

so we get $2(N-1)!/N! = 2/N$