STAT 215C – Homework 2 Solutions

Section 2.1

4. (a) $\mathcal{S}$ = {FFFF, FFFV, FFVF, FVFF, VFFF, FFVV, FVFV, VFFV, FVVF, VFVF, VVFF, FVVV, VFVV, VVFV, VVVF, VVVV}.

   (b) B = {FFFV, FFVF, FVFF, VFFF}.

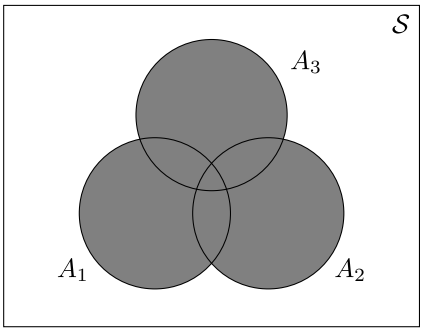
   (c) C = {FFFF, VVVV}.

   (d) D = {FFFF, FFFV, FFVF, FVFF, VFFF}.

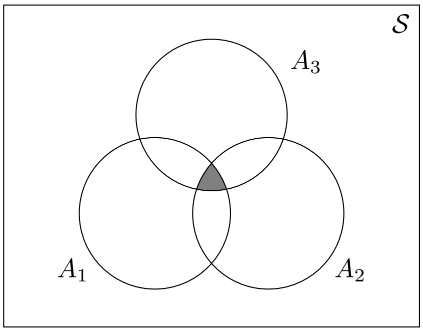
   (e) $C \cup D$ = {FFFF, VVVV, FFFV, FFVF, FVFF, VFFF}.
   $C \cap D$ = {FFFF}.

   (f) $B \cup C$ = {FFFV, FFVF, FVFF, VFFF, FFFF, VVVV}.
   $B \cap C = \emptyset$.

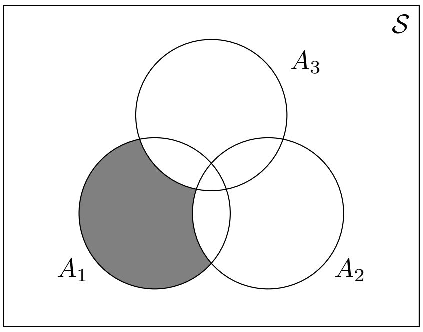
8. (a) $A_1 \cup A_2 \cup A_3$



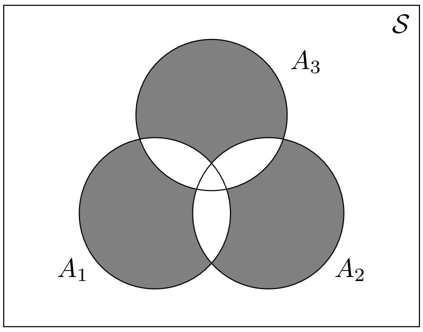
   (b) $A_1 \cap A_2 \cap A_3$



(c) $A_1 \cap A_2' \cap A_3'$



(d) $(A_1 \cap A_2' \cap A_3') \cup (A_1' \cap A_2 \cap A_3') \cup (A_1' \cap A_2' \cap A_3)$



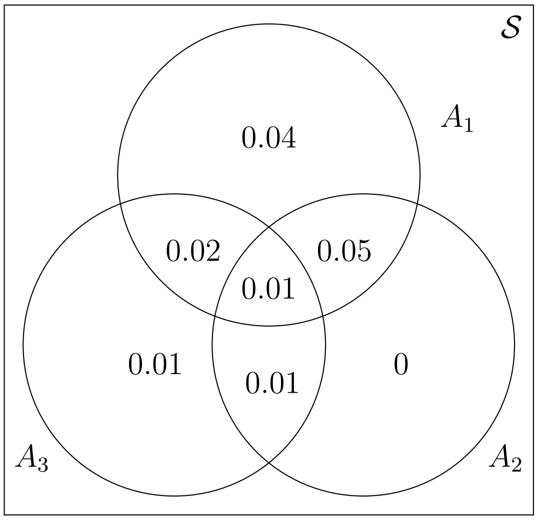
Blood Types. $\mathcal{S} = \{A^+, A^-, B^+, B^-, AB^+, AB^-, O^+, O^-\}$.

Section 2.2

12. (a) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.5 + 0.4 - 0.25 = 0.65$
    (b) $P(A' \cap B') = P[(A \cup B)'] = 1 - P(A \cup B) = 1 - 0.65 = 0.35$
    (c) $P(A \cap B') = P(A) - P(A \cap B) = 0.5 - 0.25 = 0.25$

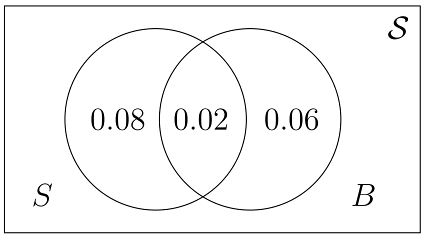
20. (a) Let D be the day shift, S be the swing shift, N be the night shift, UnS be unsafe working conditions, and UnR be unrelated to working conditions. Then
    $\mathcal{S} = \{D/UnS, D/UnR, S/UnS, S/UnR, S/UnS, S/UnR\}$
    (b) $P(UnS) = 0.1 + 0.08 + 0.05 = 0.23$
    (c) $P(D') = 1 - P(D) = 1 - (0.1 + 0.35) = 0.55$

26. I suggest filling out a *complete* Venn Diagram for this. (We will cover this in class.)



(a) $P(A_1') = 1 - P(A_1) = 1 - 0.12 = 0.88$
(b) $P(A_1 \cap A_2) = 0.05 + 0.01 = 0.06$
(c) $P(A_1 \cap A_2 \cap A_3') = 0.05$
(d) $P[(A_1 \cap A_2 \cap A_3)'] = 1 - 0.01 = 0.99$

Aircraft Defects. Again, with this problem it is helpful to draw a completed Venn diagram.



(a) $P(\text{at least one}) = 0.08 + 0.06 + 0.02 = 0.16$
(b) $P(\text{B only or S only}) = 0.06 + 0.08 = 0.14$
(c) $P(\text{neither}) = 1 - P(\text{at least one})1 - 0.14 = 0.86$