B+

2. a) A = {RRR, LLL, SSS}

b) B = {RLS, RSL, LRS, LSR, SRL, SLR}

c) C = {RRL, RLR, LRR, RRS, RSR, SRR}

d) D = {RRL, RLR, LRR, RRS, RSR, SRR, LLR, LRL, RLL, LLS, LSL, SLL, SSR, SRS, RSS, SSL, SLS, LSS}

e) D' = {RRR, LLL, SSS, RLS, RSL, LRS, LSR, SRL, SLR}

C ∪ D = {RRL, RLR, LRR, RRS, RSR, SRR, LLR, LRL, RLL, LLS, LSL, SLL, SSR, SRS, RSS, SSL, SLS, LSS}

C ∩ D = {RRL, RLR, LRR, RRS, RSR, SRR}

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

b) exactly 3 F = {FFFV, FFVF, FVFF, VFFF}

c) 4 same = {FFFF, VVVV}

d) at most 1V = {FFFF, FFFV, FFVF, FVFF, VFFF}

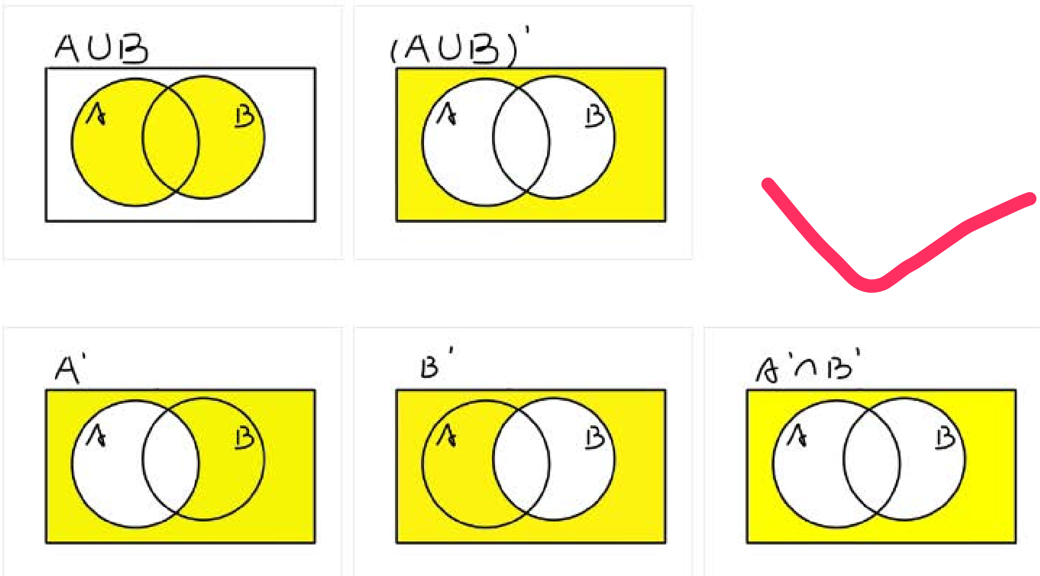
e) c ∪ d = {FFFF, FFFV, FFVF, FVFF, VFFF, VVVV}

c ∩ d = {FFFF}

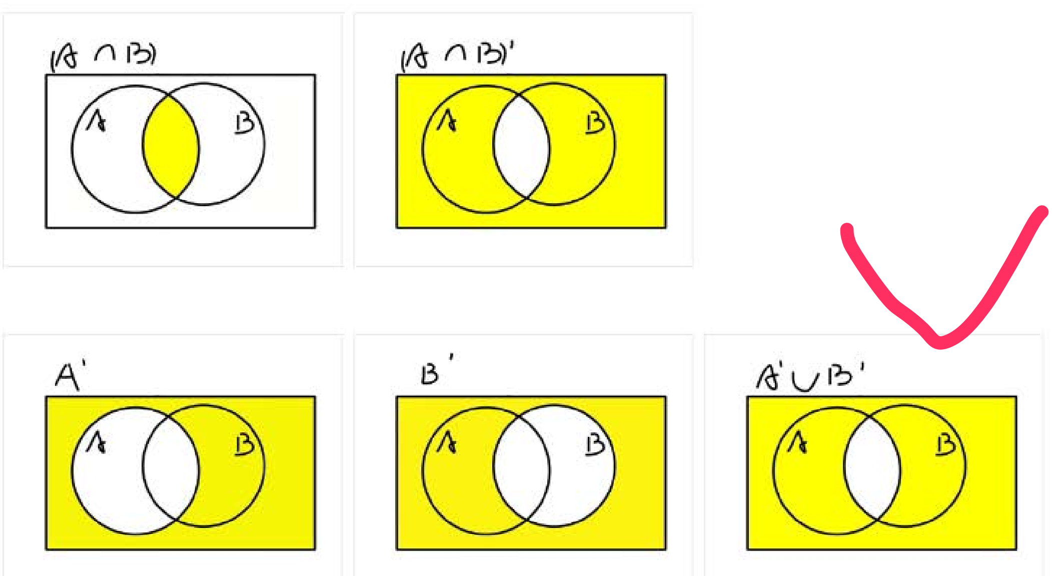
f) b ∪ c = {FFFF, FFFV, FFVF, FVFF, VFFF, VVVV}

b ∩ d = {ϕ}

9.a)



b)



12. a) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.5 + 0.4 - 0.25 = 0.65$

b) $P(A \cup B)' = 1 - 0.65 = 0.35$

c) $P(A \cap B') = 0.5 - 0.25 = 0.25$

18. $P(\text{at least } 1 \text{ TSW}) = 1 - \frac{11}{15} \times \frac{10}{14} = \frac{100}{210} = \frac{10}{21}$

27. a) $P(\text{Anderson and Box}) = \frac{2}{5} \times \frac{1}{4} = \frac{2}{20} = \frac{1}{10}$

b) $P(\text{at least } 1 \text{ C}) = 1 - \frac{4}{5} \times \frac{3}{4} = \frac{8}{20} = \frac{2}{5}$

c) $P(\text{at least 15 years}) = \frac{1}{5} \times \frac{1}{4} + \frac{1}{5} \times \frac{2}{4} + \frac{1}{5} \times \frac{2}{4} + \frac{1}{5} \times \frac{1}{4} = \frac{6}{20} = \frac{3}{10}$

30. a) $P(8,3) = \frac{8!}{(8-3)!} = 8 \times 7 \times 6 = 336$

b) $C(30,6) = \frac{30!}{6!(30-6)!} = \frac{30!}{6!24!} = 593775$

c) $C(8,2) = \frac{8!}{2!(8-2)!} = \frac{8 \times 7}{2} = 28$

$C(10,2) = \frac{10!}{2!(10-2)!} = \frac{10 \times 9}{2} = 45$

$C(12,2) = \frac{12!}{2!(12-2)!} = \frac{12 \times 11}{2} = 66$

$28 \times 45 \times 66 = 83160$

d) $P(\text{2 bottles for each}) = \frac{83160}{593775} = 0.14005\ldots$

e) $C(8,6) = \frac{8!}{6!(8-6)!} = \frac{8!}{6!2!} = 28$

$C(10,6) = \frac{10!}{6!(10-6)!} = \frac{10!}{6!4!} = 210$

$C(12,6) = \frac{12!}{6!(12-6)!} = \frac{12!}{6!6!} = 924$

$P(\text{6 bottles are same}) = \frac{28 + 210 + 924}{593775} = \frac{1162}{593775} = 0.001956\ldots$

38. a) $P(\text{exactly 2 15W}) = \frac{6}{15} \times \frac{5}{14} \times \frac{9}{13} = \frac{270}{2730} = \frac{9}{91}$

b) $P(\text{3 same rate}) = \frac{4}{15} \times \frac{3}{14} \times \frac{2}{13} + \frac{5}{15} \times \frac{4}{14} \times \frac{3}{13} + \frac{6}{15} \times \frac{5}{14} \times \frac{4}{13}$

$= \frac{24}{2730} + \frac{60}{2730} + \frac{120}{2730} = \frac{204}{2730} = \frac{34}{455} = 0.0747\ldots$

c) $P(\text{each 1 rate be selected}) = \frac{4}{15} \times \frac{5}{14} \times \frac{6}{13} = \frac{120}{2730}$

d) $P(\text{examine at least 6 times}) = 1 - P(\text{examine at most 5 times})$

$= 1 - \left(\frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} \times \frac{6}{12} \times \frac{5}{11}\right)$

$= 1 - \left(\frac{3}{5} \times \frac{4}{7} \times \frac{7}{13} \times \frac{1}{2} \times \frac{5}{11}\right)$

$= 1 - \left(3 \times 4 \times \frac{1}{13} \times \frac{1}{2} \times \frac{1}{11}\right)$

$= 1 - \frac{12}{286} = 1 - \frac{6}{143} = \frac{137}{143}$

$= 1 - \left(\frac{6}{15} + \frac{9}{15} \times \frac{6}{14} + \frac{9}{15} \times \frac{8}{14} \times \frac{6}{13} + \frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} \times \frac{6}{12} + \frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} \times \frac{6}{12} \times \frac{6}{11}\right)$

$= 1 - \left(\frac{6}{15} + \frac{9}{35} + \frac{72}{455} + \frac{42}{455} + \frac{252}{5005}\right)$

$= 1 - 0.95804\ldots = 0.04196\ldots$

40. a) $12!$

b) $(3! \times 3! \times 3! \times 3!) \times 4! = 31104$

$P(\text{3 molecules next to one another}) = \frac{(3! \times 3! \times 3! \times 3!)4!}{12!}$

$= 0.000064935\ldots$