Peck, Olsen & Devore, Chapter 6

Exercises 6.1 – 6.13

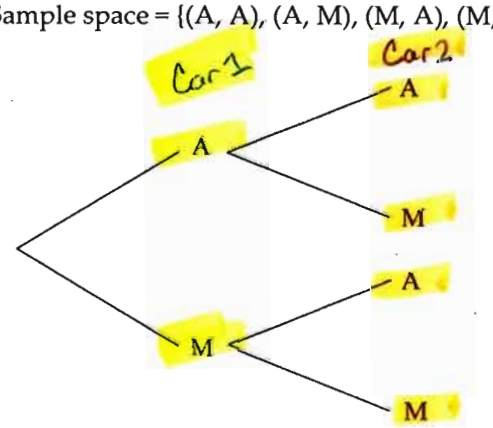
6.1 A chance experiment is any activity or situation in which there is uncertainty about which of two or more possible outcomes will result.

Consider tossing a coin two times and observing the outcome of the two tosses. The possible outcomes are (H, H), (H, T), (T, H), and (T, T), where (H, H) means both tosses resulted in Heads, (H, T) means the first toss resulted in a Head and the second toss resulted in a Tail, etc. This is an example of a chance experiment with four possible outcomes.

6.2 The collection of all possible outcomes of a chance experiment is the sample space for the experiment. The sample space for the experiment described in Problem **6.1** is {(H, H), (H, T), (T, H), (T, T)}.

6.3 **a** Sample space = {(A, A), (A, M), (M, A), (M, M)}.

b



ENGINE: (A)utomatic (M)anual

c B = {(A, A), (A, M), (M, A)} B = event that atleast one car is automatic
C = {(A, M), (M, A)} C = event that exactly 1 car is automatic
D = {(M, M)} D = event that neither car is automatic
Only D is a simple event. ← A simple event has only 1 possible outcome

d B and C = {(A, M), (M, A)} = C "AND" means intersection ($A \cap B$)
B or C = {(A, A), (A, M), (M, A)} = B "OR" means union ($A \cup B$)

6.4 **a** A = {Head oversize, Prince oversize, Slazenger oversize, Wimbledon oversize, Wilson oversize} A = event that an oversize racquet bought (5 outcomes)

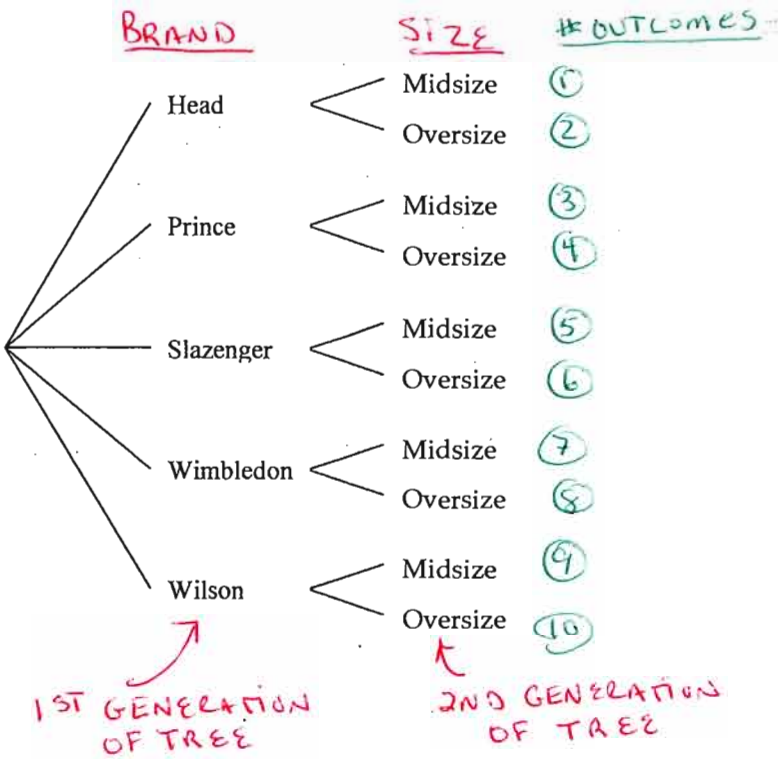
b B = {Wimbledon midsize, Wimbledon oversize, Wilson midsize, Wilson oversize}
B = event with brand begins with a W (4 outcomes)

c In part **b**, Not B = {Head midsize, Head oversize, Prince midsize, Prince oversize, Slazenger midsize, Slazenger oversize} NOT B has 6 outcomes

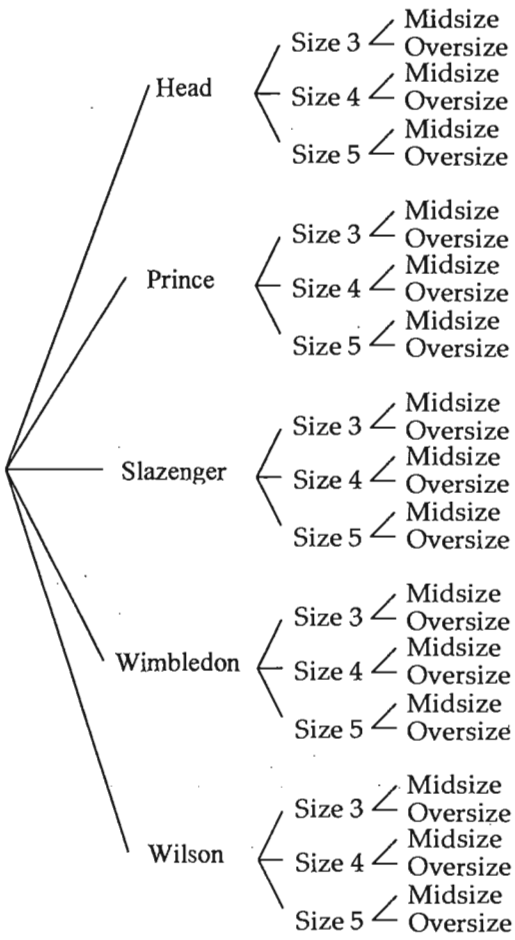
d B or C = { Head midsize, Head oversize, Prince midsize, Prince oversize, Wimbledon midsize, Wimbledon oversize, Wilson midsize, Wilson oversize} OR means outcomes in either B or C. HAS 8 OF 10 POSSIBLE OUTCOMES

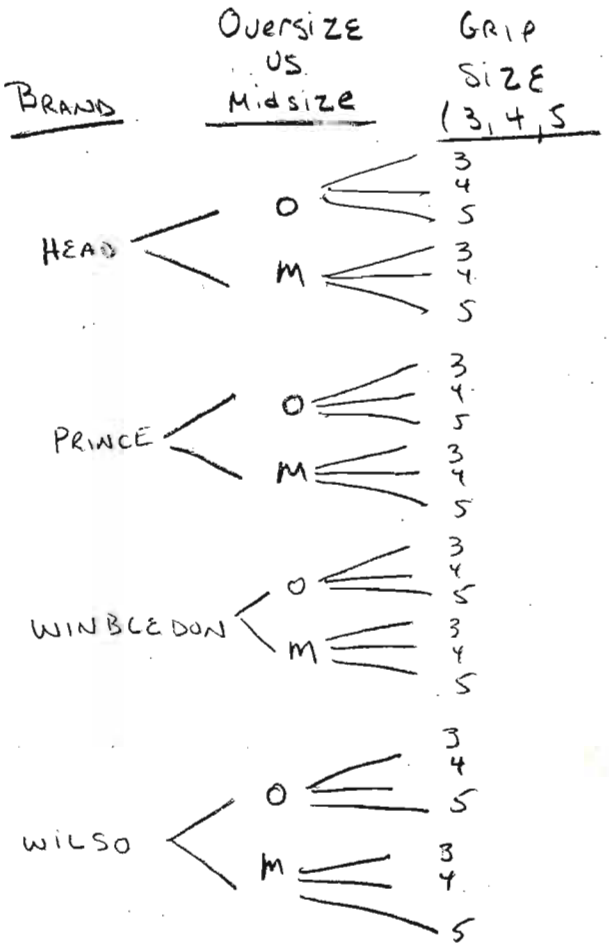
e B and C = { Wilson midsize, Wilson oversize }
AND means the intersection. OUTCOMES MUST BE IN BOTH B AND C

f



g





Total 27 OUTCOMES

b B = {DDNN, DNDN, NDDN}

c The number of possible outcomes is infinite.

6.10 **a** The 27 possible outcomes are (1,1,1), (1,1,2), (1,1,3), (1,2,1), (1,2,2), (1,2,3), (1,3,1), (1,3,2), (1,3,3), (2,1,1), (2,1,2), (2,1,3), (2,2,1), (2,2,2), (2,2,3), (2,3,1), (2,3,2), (2,3,3), (3,1,1), (3,1,2), (3,1,3), (3,2,1), (3,2,2), (3,2,3), (3,3,1), (3,3,2), (3,3,3).

b A = {(1,1,1), (2,2,2), (3,3,3)}

c B = {(1,2,3), (1,3,2), (2,1,3), (2,3,1), (3,1,2), (3,2,1)}

d C = {(1,1,1), (1,1,3), (1,3,1), (1,3,3), (3,1,1), (3,1,3), (3,3,1), (3,3,3)}

e B^c = {(1,1,1), (1,1,2), (1,1,3), (1,2,1), (1,2,2), (1,3,1), (1,3,3), (2,1,1), (2,1,2), (2,2,1), (2,2,2), (2,2,3), (2,3,2), (2,3,3), (3,1,1), (3,1,3), (3,2,2), (3,2,3), (3,3,1), (3,3,2), (3,3,3)}

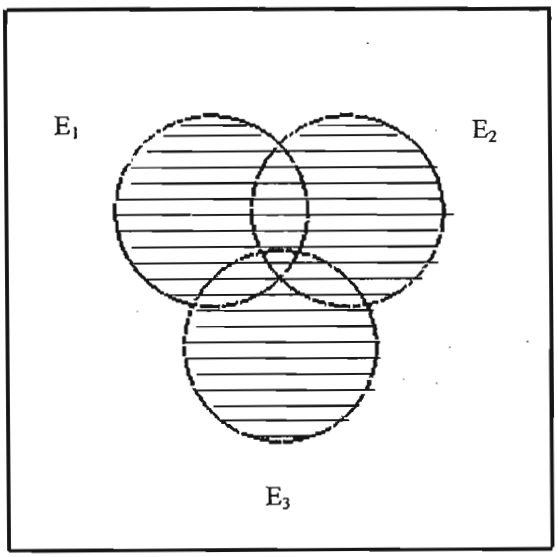
C^c = {(1,1,2), (1,2,1), (1,2,2), (1,2,3), (1,3,2), (2,1,1), (2,1,2), (2,1,3), (2,2,1), (2,2,2), (2,2,3), (2,3,1), (2,3,2), (2,3,3), (3,1,2), (3,2,1), (3,2,2), (3,2,3), (3,3,2)}

$A \cup B$ = {(1,1,1), (2,2,2), (3,3,3), (1,2,3), (1,3,2), (2,1,3), (2,3,1), (3,1,2), (3,2,1)}

$A \cap B$ = the empty set. There are no outcomes common to A and B.

$A \cap C$ = {(1,1,1), (3,3,3)}

6.11 **a**



A

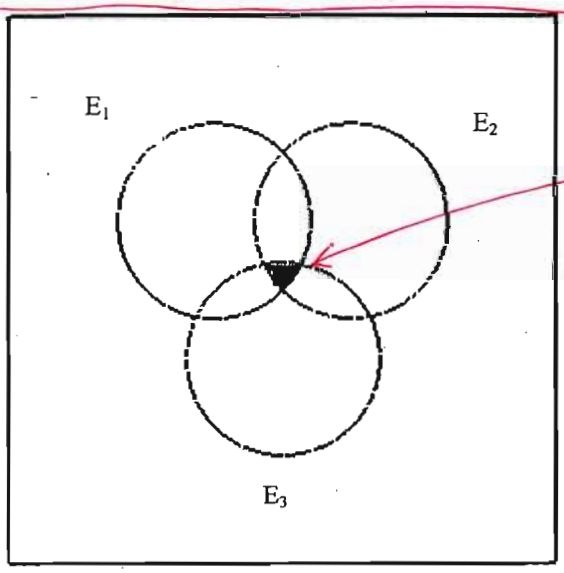
E_1: Site 1 Plant

E_2: Site 2 Plant

E_3: Site 3 plant

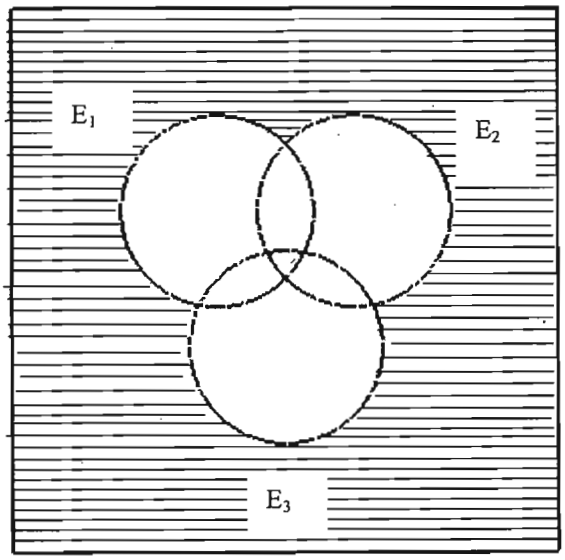
AT LEAST 1 PLANT COMPLETED BY CONTRACT DATE

b The required region is the area common to all three circles.



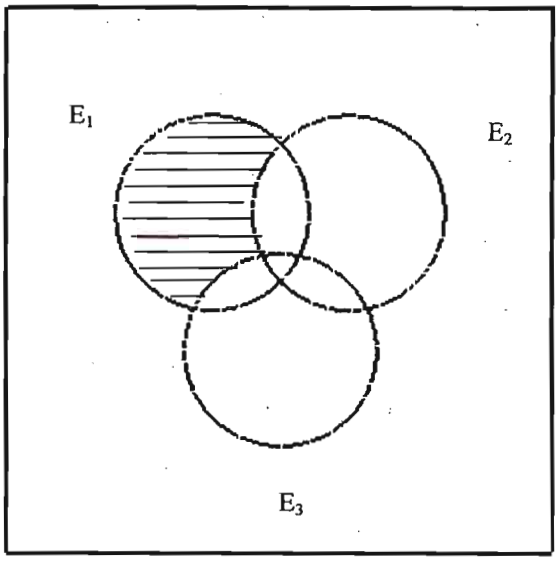
B ALL PLANTS ARE COMPLETED BY CONTRACT DATE.

c



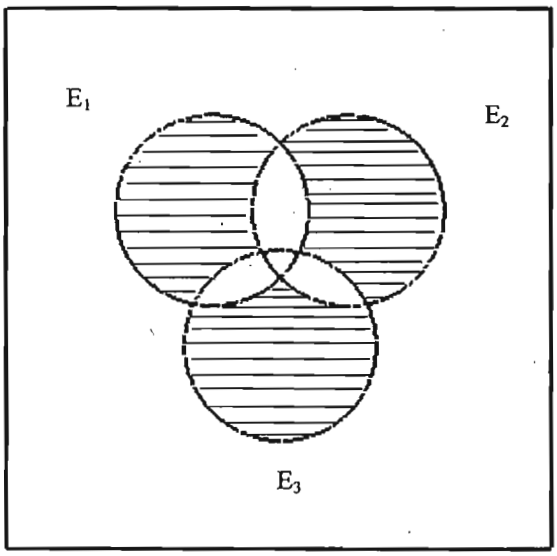
C NONE OF THE PLANTS MEET CONTRACT DATE

d



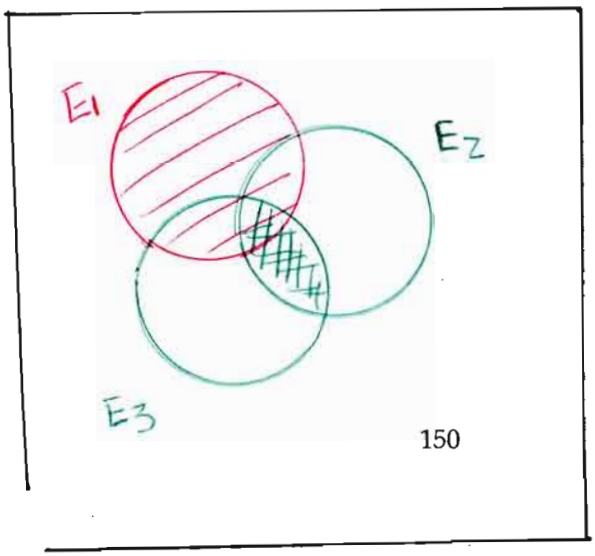
D
ONLY PLANT 1
MEETS CONTRACT DATE
NOTE SECTIONS OF E2
AND E3 ARE NOT FILLED
IN.

e



E EXACTLY 1 OF
THE 3 is completed
by contract date.

f



F EITHER PLANT 1
OR BOTH OF OTHER
2 PLANTS MEET
CONTRACT DATE