HW2 Nasser AlRasbi

2.1.1

In the box = 4 ⟶ which are 40-w bulbs
+
5 ⟶ which are 60-w ballbs

6 ⟶ which are 75-w ballbs

In the box = 4+5+6 = 15 ballbs

For three bulbs selected randomly will be = $\frac{n!}{k!(n-k)!}$.

Domain = $\frac{15!}{3!.(15-3)!} = \frac{15!}{3! \times 12!} = 15 \times 14 \times 13 = 455$

(a) exactly 2 from 75-w

probabilit ~~ways~~ for exactly 2 from 75 = $\frac{(2 \text{ from } 75)(1 \text{ from other})}{\text{Domain}}$

2 from 75 = $\frac{6!}{2!(6-2)!} = 15$

1 from (60+40) = $\frac{9!}{1!.(9-1)!} = 9$

probality of pulling excatly 2 from 75 = $\frac{(15)(9)}{(455)}$

$$\boxed{P(a) = \frac{135}{455} = 0.297}$$

ⓑ probality that all three from each type we should calcute each posiblites and divedes by domain to get probality

$\# \text{ ways to pull 3 from 7S-w} = \frac{6!}{3!\,3!} = 20$

$\# \text{ ways to pull 3 from 6o-w} = \frac{5!}{3!\,2!} = 10$

$\# \text{ ways to pull 3 fromo 4o-w} = \frac{4!}{3!\,1!} = 4$

probality to choose three from each type $= \frac{20+10+4}{455}$

$$\boxed{P(b) = \frac{34}{455} = 0.075}$$

ⓒ probaliy to choose one from each we will solve it like part ⓐ

$\# \text{ ways to pull 1 from 7S-w} = \frac{6!}{1!\,5!} = 6$

$\# \text{ ways to pull 1 from 6o-w} = \frac{5!}{1!\,4!} = 5$

$\# \text{ ways to pull 1 from 4S-w} = \frac{4!}{1!\,3!} = 4$

probality to choose one from each $= \frac{(7S \text{ ways})(6o \text{ ways})(4S \text{ ways})}{\text{Domain}}$

$$\boxed{P(c) = \frac{6 \times 5 \times 4}{455} = \frac{120}{455} = 0.264}$$

ⓓ The probaility will take at least 6 bulbs meas the probality of (1 - the probaitly of five tri~~es~~ ev to find 75-w exactly)

$p(\text{of find 1-75w from 15}) = \frac{6}{15} = 0.4$

$p(\text{of finding 2 from } \cancel{75}\ 15) = \frac{9}{15} \times \frac{6}{14} = 0.257$

$p(\text{of finding 3 from 15}) = \frac{9}{15} \times \frac{8}{14} \times \frac{6}{13} = 0.158$

$p(\text{of finding 4 from 15}) = \frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} \times \frac{6}{12} = 0.092$

$p(\text{of finding 5 from 15}) = \frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} \times \frac{6}{12} \times \frac{6}{11} = 0.050$

Total propality of finding it is nessary for the first 5 tries $= 0.4 + 0.257 + 0.158 + 0.092 + 0.050 = 0.958$

$\therefore$ propality at least (6) $= 1 - 0.958 = \boxed{0.042}$