MSDA-BRIDGE - WEEK 1 - DATA SCIENCE | ARUN KUMA

2.12 Total Students = S (sample space)
Students missing 1 day at school = 25% S = 0.25 S
Students missing 2 day at school = 15% S = 0.15 S
Students missing 3 day or more at school = 28% S = 0.28 S

(a) P(student not missing any days) ⇒ 1 − P(All students missing atleast 1 class)
⇒ 1 − (0.25 + 0.15 + 0.28)
⇒ 1 − 0.68 ⇒ 0.32 ⇒ 32%

(b) P(Student missing no more than one day) ⇒ P(student not missing any day) or P(Student missing exactly one day)
⇒ 0.32 + 0.25
⇒ 0.57 ⇒ 57%

(c) P(Student missing atleast one day) = P(student missing 1 day) + P(Student missing 2 day) + P(Student missing 3 or more days)
⇒ 0.25 + 0.15 + 0.28
⇒ 0.68 ⇒ 68%

(d) P(both kids not missing any day) = P(first kid not missing any day) × P(Second kid not missing any day)
⇒ 0.32 × 0.32 (independent process)
⇒ 0.1024 ⇒ 10.24%

(e) P(both kids missing atleast one day) = P(first kid missing atleast 1 day) × P(second kid missing atleast 1 day)
⇒ 0.68 × 0.68
⇒ 0.4624 ⇒ 46.24%

(f) I made an assumption that both events are independent & Kids missing schools didn't depend on each other.

2.14

(a) $P\left(\begin{matrix}\text{overweight and}\\ \text{doesn't have health coverage}\end{matrix}\right) = \dfrac{\text{Total overweight}}{\text{Total Sample space}}$

$\Rightarrow \dfrac{15327}{428638} \Rightarrow 0.0357 \Rightarrow 3.57\%$

(b) $P\left(\begin{matrix}\text{overweight or}\\ \text{doesn't have health coverage}\end{matrix}\right) = P(\text{overweight}) + P\left(\begin{matrix}\text{doesn't have}\\ \text{health coverage}\end{matrix}\right) - P\left(\begin{matrix}\text{overweight \& doesn't}\\ \text{have health coverge}\end{matrix}\right)$

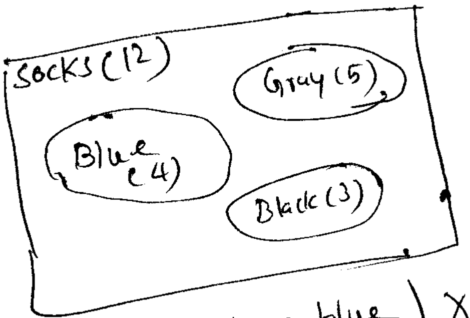
$\Rightarrow \dfrac{157026}{428638} + \dfrac{44837}{428638} - 0.0357$

$\Rightarrow 0.366 + 0.1046 - 0.0357$

$\Rightarrow 0.4706 - 0.0357$

$\Rightarrow 0.435 \Rightarrow 43.5\%$

2.28



(a) $P\left(\begin{matrix}\text{two blue}\\ \text{socks}\end{matrix}\right) = P\left(\begin{matrix}\text{one blue}\\ \text{sock}\end{matrix}\right) \times P\left(\begin{matrix}\text{second blue}\\ \text{sock}\end{matrix}\right)$

$\Rightarrow \dfrac{4}{12} \times \dfrac{3}{11}$

$\Rightarrow 1/11 \Rightarrow 0.0909 \Rightarrow 9.09\%$

(b) $P\left(\begin{matrix}\text{no gray}\\ \text{sock}\end{matrix}\right) \Rightarrow 1 - P\left(\begin{matrix}\text{both gray}\\ \text{sock}\end{matrix}\right)$

$\Rightarrow 1 - \left[P\left(\begin{matrix}\text{first gray}\\ \text{sock}\end{matrix}\right) \times P\left(\begin{matrix}\text{second gray}\\ \text{sock}\end{matrix}\right)\right]$

$\Rightarrow 1 - \left[\dfrac{5}{12} \times \dfrac{4}{11}\right]$

$\Rightarrow 1 - \dfrac{5}{33} \Rightarrow \dfrac{28}{33} \Rightarrow 0.8484 \Rightarrow 84.84\%$

2.28

(c) $P\left(\begin{matrix}\text{atleas 1 black}\\ \text{Sock}\end{matrix}\right) = 1 - P\left(\text{No black sock}\right)$

$\Rightarrow 1 - \left[P\left(\begin{matrix}\text{first sock}\\ \text{either blue or}\\ \text{gray}\end{matrix}\right) \times P\left(\begin{matrix}\text{second sock}\\ \text{either blue or}\\ \text{gray}\end{matrix}\right)\right]$

$\Rightarrow 1 - \left[\frac{9}{12} \times \frac{8}{11}\right]$

$\Rightarrow 1 - \frac{6}{11} \Rightarrow \frac{5}{11} \Rightarrow 0.4545$

$\Rightarrow 45.45\%$

(d) $0\% \Rightarrow$ No green sock

(e) $P\left(\begin{matrix}\text{matching}\\ \text{Sock}\end{matrix}\right) = P\left(\begin{matrix}\text{both gray}\\ \text{socks}\end{matrix} \text{ or } \begin{matrix}\text{both blue}\\ \text{socks}\end{matrix} \text{ or } \begin{matrix}\text{both black}\\ \text{socks}\end{matrix}\right)$

$\Rightarrow P\left(\begin{matrix}\text{both gray}\\ \text{sock}\end{matrix}\right) + P\left(\begin{matrix}\text{both blue}\\ \text{sock}\end{matrix}\right) + P\left(\begin{matrix}\text{both black}\\ \text{sock}\end{matrix}\right)$

$\Rightarrow \left(\frac{5}{12} \times \frac{4}{11}\right) + \left(\frac{4}{12} \times \frac{3}{11}\right) + \left(\frac{3}{12} \times \frac{2}{11}\right)$

$\Rightarrow \frac{5}{33} + \frac{1}{11} + \frac{1}{22}$

$\Rightarrow 0.1515 + 0.0909 + 0.04545 \Rightarrow 0.2878$

$\Rightarrow 28.78\%$

2.30

(a) $P\left(\begin{matrix}\text{drawing hardcover first}\\ \text{and then paperback}\end{matrix}\right)$

$\Rightarrow P\left(\text{drawing hardcover}\right) \times P\left(\begin{matrix}\text{drawing paperback}\\ \text{after drawing hardcover}\end{matrix}\right)$

$\Rightarrow \frac{28}{95} \times \frac{59}{94} \Rightarrow 0.2947 \times 0.6276$

$\Rightarrow 0.1849$

$\Rightarrow 18.49\%$

2.30

(b) $P\left(\begin{array}{l}\text{drawing a fiction book first} \\ \text{and then hard cover book without replacement}\end{array}\right)$

$\Rightarrow P\left(\begin{array}{c}\text{drawing a fiction} \\ \text{book}\end{array}\right) \times P\left(\begin{array}{c}\text{drawing a} \\ \text{hard cover}\end{array} \text{w/o replacement}\right)$

$\Rightarrow \frac{72}{95} \times \frac{27}{94}$

$\Rightarrow 0.7579 \times 0.2872 \Rightarrow 0.2177 \Rightarrow 21.77\%$

(c) $P\left(\begin{array}{c}\text{drawing a fiction \& then hard cover} \\ \text{with replacement}\end{array}\right)$

$\Rightarrow P(\text{drawing a fiction}) \times P\left(\text{drawing} \begin{array}{c}\text{a hard cover} \\ \text{with replacement}\end{array}\right)$

$\Rightarrow \frac{72}{95} \times \frac{28}{95} \Rightarrow 0.7579 \times 0.2947$

$\Rightarrow 0.2233 \Rightarrow 22.33\%$

(d) Answer to (b) & (c) are close, as in case of (c) when the first book is replaced, the total possibilities of hard cover increases & also total number of book also increases. Both numerator & denominator increased & hence no significant change in answers.