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Assignment 2

1 (a) P(2 or 4)

$P(\text{urn1}) = 1/2$ $Pr(\text{urn2}) = 1/2$

$P(2/\text{urn1}) = \frac{1}{2}$

$P(2 \text{ or } 4/\text{urn2}) = \frac{1}{5}$

So $\frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{5} = \frac{1}{4} + \frac{1}{10}$

$= \frac{10+4}{40} = \frac{14}{40} = \frac{7}{20} = \boxed{0.35}$

(b) P(3)

$\frac{1}{2} \times \frac{1}{4} + \frac{1}{2} \times (0) = \frac{1}{8} = \boxed{0.125}$

(c) $\frac{1}{2} \times \frac{1}{4} + \frac{1}{2} \times \frac{1}{4} = \frac{1}{4} = \boxed{0.25}$

no 9 is present in urn 1 so $P(1/\text{urn1}) = 1/4$

no 1 is present in urn 2 $P(9/\text{urn2}) = 1/4$

(2) P(Favourable) = Favourable outcomes / Total Outcomes

Total Outcomes $= {}^{15}C_4 = \frac{15!}{4!\,11!} = \frac{15 \times 14 \times 13 \times 12 \times 11!}{4 \times 3 \times 2 \times 1 \times 11!}$

$= 105 \times 13$

Favourable outcomes $= {}^{6}C_2 \times {}^{4}C_1 \times {}^{5}C_1 + {}^{6}C_1\,{}^{4}C_2 \times {}^{5}C_1$ (one ball of each colour + one ball of one of the colour) $+ {}^{6}C_1\,{}^{4}C_1 \times {}^{5}C_2$

$= 15 \times 4 \times 5 + 6 \times 6 \times 5 + 6 \times 4 \times 10$

$= 300 + 180 + 240$

$= 720.$

$P = \frac{720}{105 \times 13} = \boxed{0.5274}$ Ans

(3) @ P (all favourable) $P(A) = \frac{3}{5}$

$= \frac{3}{5} \times \frac{4}{7} \times \frac{2}{5} = \frac{24}{175} = 0.1375$ $P(B) = \frac{4}{7}$

$P(C) = \frac{2}{5}$

(5) at least 2 will be favourable (majority)

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

$+ \left(1 - \frac{3}{5}\right) \times \frac{4}{7} \times \frac{2}{5}$ + P(all) favourable

$\left(\frac{3}{5}\right)^2 \times \frac{4}{7} + \frac{6}{25} \times \frac{3}{7} + \left(\frac{2}{5}\right)^2 \times \frac{4}{7} + \frac{24}{175}$

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$$= \frac{9}{25} \times \frac{4}{7} + \frac{18}{175} + \frac{16}{175} + \frac{24}{175}$$

$$= \boxed{\frac{94}{175}}$$

(c) one minus exact favourable.

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

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

$$\frac{3}{5} \times \frac{3}{7} \times \frac{3}{5} + \frac{2}{5} \times \frac{4}{7} \times \frac{3}{5} + \frac{2}{5} \times \frac{3}{7} \times \frac{2}{5}$$

$$= \frac{27}{175} + \frac{24}{175} + \frac{12}{175} = \frac{63}{175}$$

(d) at least exactly two (already calculated)

$$\frac{94}{175} - \frac{24}{175} \quad \text{Ans b} - \text{Ans a} = \boxed{\frac{70}{175}}$$

(e) $1 - P$(no movies are good)

$$1 - \frac{2}{5} \times \frac{3}{7} \times \frac{3}{5} = 1 - \frac{18}{175} = \boxed{\frac{157}{175}}$$