3F cont...

⑥ Coin & 6 sided die

P(H and not 6)

obviously independent objects

$\therefore P(H) \times P(\text{not } 6)$

$\frac{1}{2} \cdot \frac{5}{6} = \boxed{\frac{5}{12}}$

⑦ Each missle is independent of the previous one

$P(\text{hitting target}) = \frac{8}{9}$

$\therefore P(\text{missing target}) = 1 - \frac{8}{9} = \frac{1}{9}$

P(missing target 5 times)

$= \frac{1}{9} \cdot \frac{1}{9} \cdot \frac{1}{9} \cdot \frac{1}{9} \cdot \frac{1}{9}$

$= \boxed{\frac{1}{59049}}$

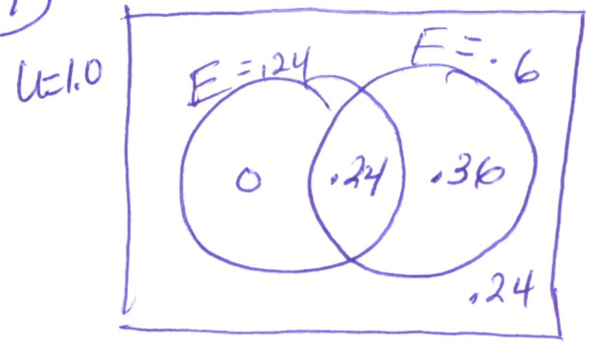
⑧ 4 cards, w/ replacement

∴ independent

$P(\text{4 hearts in a row}) = \frac{13}{52} \cdot \frac{13}{52} \cdot \frac{13}{52} \cdot \frac{13}{52}$

$= \boxed{\frac{28561}{7311616}}$

⑨



$.6 - .24 = .36$

$P(E') = .6$

$.36 + P(\text{neither}) = .6$

$P(\text{neither}) = .24$

$.24 + .24 + .36 = 1$

$\therefore P(E \text{ only}) = 0$

a) $P(E) = .24$

✱b) $P(E) \times P(F) \stackrel{?}{=} P(E \cap F)$

$.24 \times .6 \stackrel{?}{=} .24$

$.144 \stackrel{?}{=} .24$

∴ E and F are <u>not</u> independent

c) E and F are not mutually exclusive b/c $P(E \cap F) \neq 0$

d) $P(E \cup F') = .24 + .24$

$= .48$

Probability Problem Set #3

Exercise 3F

① 5 shirts: 1 Blue
1 Brown
1 Red
1 White
1 Black

2 shirts with Replacement
∴ independent

$\frac{1}{5} \cdot \frac{1}{5} = \boxed{\frac{1}{25}}$

---

② 52 cards: 2 cards w/ replacement
∴ independent

$\frac{4}{52} \cdot \frac{4}{52} = \boxed{\frac{16}{2704}}$

---

③ Survey $\frac{4}{5}$ = pasta

large school (no total # given)

3 selected w/o replacement but still independent b/c school is large

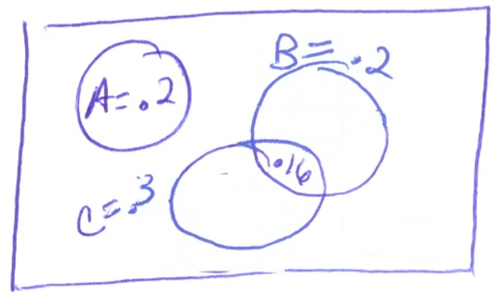
$\frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} = \boxed{\frac{64}{125}}$

---

③ P(win cricket) = .75
P(win hockey) = .85
"Assume independent"
P(win both) = .75 · .85
$= \boxed{.6375}$

---

⑤ A, B, C mutually exclusive (A and B)



U = 1.0

P(A∪B) = .4 ∴ P(B) = .2

.2 + .2 + .3 = .7 ∴ P(none) = .3

a) P(B) = .2 P(B∩C) = 0

b) $P(B \cup C) = P(B) + P(C) - P(B \cap C)$

$.34 = .2 + .3 - P(B \cap C)$

$.34 = .5 - P(B \cap C)$

$-.16 = -P(B \cap C)$

$.16 = P(B \cap C)$

Test for independence:

$P(B \cap C) \stackrel{?}{=} P(B) \times P(C)$

$.16 \stackrel{?}{=} .2 \times .3$

$.16 \stackrel{?}{=} .06$

no ∴ B and C are not independent

or

$P(B|C) \stackrel{?}{=} P(B)$

$\frac{P(B \cap C)}{P(C)} \stackrel{?}{=} P(B)$

$\frac{.16}{.3} \stackrel{?}{=} .2$

no

3F cont

(10) 3 bags, each have 4 Red, 8 Blue

P(R, B, R)

separate bags ∴ independent

P(R) × P(B) × P(R)

$\frac{4}{12} \times \frac{8}{12} \times \frac{4}{12} = \boxed{\frac{128}{1728}}$

(11) 6 sided die

1, 2, 2, 5, 6, 6

3 rolls ∴ independent

P(scores add up to 6)

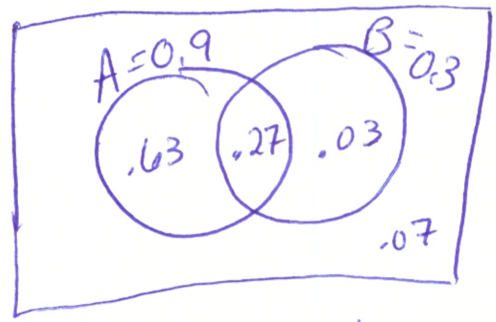
the only way to get 6 is 2, 2, 2

∴ P(2) × P(2) × P(2)

$= \frac{2}{6} \times \frac{2}{6} \times \frac{2}{6}$

$= \boxed{\frac{8}{216}}$

(12) "A and B are independent"



U = 1

$0.9 + 0.3 = 1.2$

a) $P(A \cap B) = P(A) \times P(B)$
$= \boxed{.27}$

b) $.3 - .27 = .03$
$.9 - .27 = .63$

$.63 + .27 + .03 = .93$
$1 - .93 = .07$

$P(A \cap B') = \boxed{.63}$
↑ P(A only)

c) $P(A \cup B)' = \boxed{.07}$
↑ P(neither)