HW#2B : SOLUTIONS

⑧

$$1 - \frac{365}{365} \cdot \frac{364}{365} \cdot \frac{363}{365} \cdot \frac{362}{365} \cdot \frac{361}{365}$$

⑨

a) $\quad \frac{3}{20} \cdot \frac{11}{19} = \boxed{\frac{33}{95}}$ $\qquad \frac{\binom{12}{2}\binom{8}{0}}{\binom{20}{2}} = \frac{33}{95}$

b) $\quad \frac{8}{20} \cdot \frac{7}{19} = \boxed{\frac{14}{95}}$ $\qquad \frac{\binom{8}{2}\binom{12}{0}}{\binom{20}{2}} = \boxed{\frac{14}{95}}$

c) $P(dn) + P(nd) = \frac{12}{20} \cdot \frac{8}{19} + \frac{8}{20} \cdot \frac{12}{19} = \boxed{\frac{48}{95}}$ $\qquad \frac{\binom{8}{1}\binom{12}{1}}{\binom{20}{2}} = \boxed{\frac{48}{95}}$

⑩ For one person:

$P(0 \text{ heads}) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

$P(1 \text{ head}) = 3\left(\frac{1}{2}\right)^3 = \frac{3}{8}$

$P(2 \text{ heads}) = 3\left(\frac{1}{2}\right)^3 = \frac{3}{8}$

$P(3 \text{ heads}) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

$\therefore P(\text{both have the same number of heads}) = \frac{1}{8} \cdot \frac{1}{8} + \frac{3}{8} \cdot \frac{3}{8} + \frac{3}{8} \cdot \frac{3}{8} + \frac{1}{8} \cdot \frac{1}{8} = \boxed{\frac{5}{16}}$

(11.) $\quad$ A = different numbers $\qquad$ B = one is a 4

$P(B|A) = \dfrac{P(A \cap B)}{P(A)} \cdot \dfrac{10/36}{30/36} = \boxed{\dfrac{1}{3}}$

(12.) P(one is a spade
and one is a King) = P(spade on 1st & K on 2nd)
$\qquad\qquad\qquad + P$(K on 1st & spade on 2nd)

$= [P$(non-K spade on 1st & K on 2nd)
$\qquad\qquad + P$(spade K on 1st & K on 2nd)$]$
$+ [P$(non-spade K on 1st & spade on 2nd)
$\qquad\qquad + P$(sp K on 1st & spade on 2nd)$]$

$= \left[\dfrac{12}{52} \cdot \dfrac{4}{51} + \dfrac{1}{52} \cdot \dfrac{3}{51}\right] + \left[\dfrac{3}{52} \cdot \dfrac{13}{51} + \dfrac{1}{52} \cdot \dfrac{12}{51}\right] = \boxed{\dfrac{1}{26}}$

(13.) No! Knowledge of one event occurring EXCLUDES
the other event
$A \cap B = \varphi \Rightarrow P(A \cap B) = 0 \Rightarrow$ either $P(A) = 0$ or $P(B) = 0$

(14.)

a) $R = (.8)(.98) = .784$
b) $R = (.8)(.75)(.98) = .588$
c) $R = [.8 + .98 - (.8)(.98)][.75] = .747$
 or $R = [1 - (1-.8)(1-.98)][.75] = .747$