Week 9.

Problem 1.

1). 1. P(All coins are Heads)

$= P(\boxed{H} \& \boxed{H} \& \boxed{H})$.

$\overset{\text{indep}}{=} P(H) \times P(H) \times P(H) = \left(\frac{1}{2}\right)^3$.

2. P(None of three are Heads).

$= P(T \& T \& T) \overset{\text{indep.}}{=} P(T)^3 = \left(\frac{1}{2}\right)^3$.

3. P("Not" All Heads)

$\overset{\text{complement.}}{=} 1 - \underbrace{P(\text{All Heads})}_{\text{From above.}} = 1 - \left(\frac{1}{2}\right)^3$.

4. P("At least" one is Head).

$= 1 - P(\text{None of them are Head})$

$= 1 - (1/2)^3$.

"dice"

2) 1. $P(\text{all \# are 2})$.

$= P(\boxed{2} \,\&\, \boxed{2} \,\&\, \boxed{2})$

$\overset{\text{indep}}{=} P(\boxed{2}) \times P(\boxed{2}) \times P(\boxed{2}) = \left(\frac{1}{6}\right)^3$.

2. $P(\text{None of three are 2})$

$= P(\boxed{\text{Not } 2} \,\&\, \boxed{\text{Not } 2} \,\&\, \boxed{\text{Not } 2})$

$= \left(\frac{5}{6}\right) \times \left(\frac{5}{6}\right) \times \left(\frac{5}{6}\right) = \left(\frac{5}{6}\right)^3$.

3. $P(\text{"Not" All 2})$.

$= 1 - P(\text{All 2}) = 1 - \left(\frac{1}{6}\right)^3$.

4. $P(\text{"At least" one is 2})$.

$= 1 - P(\text{None of three are 2})$

$= 1 - \left(\frac{5}{6}\right)^3$.

5. $P(\text{min of three} > 3)$

$= P(\text{first \#} > 3 \text{ and } \text{second \#} > 3 \text{ and } \text{third \#} > 3)$

$\overset{\text{indep}}{=} P(\text{first \#} > 3) \times P(\text{second \#} > 3) \times P(\text{third \#} > 3)$

$= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{2}\right)^3$.

$\uparrow \frac{3}{6}$.

3) Shuffled deck.

$\Rightarrow$ 4 shape $\times$ 13 cards $= 52$ cards in total.

1. P(All the cards are heart)

$= P(H \& H \& H)$.

"NOT" indep $= P(H) \times P(H \mid \text{first was H}) \times P(H \mid \text{first \& second were H})$

$= \frac{13}{52} \times \frac{12}{51} \times \frac{11}{50}$

2. P(None of three are diamonds).

$= P(\boxed{\text{Not D}} \& \boxed{\text{Not D}} \& \boxed{\text{Not D}})$.

"Not" indep $= P(\text{Not D}) \times P(\text{Not D} \mid \text{First was not D}) \times P(\text{Not D} \mid \text{First \& second were Not D})$

$= \frac{39}{52} \times \frac{38}{51} \times \frac{37}{50}$.

3. P(Not All D)

this should be hold, right I wrote this b/c I want to use the answer for the first problem.

$= 1 - P(\text{All D}) = 1 - P(\text{All H}) = 1 - \left(\frac{13}{52} \times \frac{12}{51} \times \frac{11}{50}\right)$.

or just directly go to here

4. P(At least one is H)

$= 1 - P(\text{None of three are H})$

$= 1 - \left(\frac{39}{52} \times \frac{38}{51} \times \frac{37}{50}\right)$.