1. **Uniform Probability Space**

   Let $\Omega = \{1,2,3,4,5,6\}$ be a uniform probability space. Let also $X(\omega)$ and $Y(\omega)$, for $\omega \in \Omega$, be the random variables defined as follows:

   Table 1: The random variables X and Y.

ω	1	2	3	4	5	6
$X(\omega)$	0	0	1	1	2	2
$Y(\omega)$	0	2	3	5	2	0

   (a) Calculate $V = L[Y|X]$;

   (b) Calculate $W = E[Y|X]$;

   (c) Calculate $E[(Y-V)^2]$;

   (d) Calculate $E[(Y-W)^2]$.

   [*Hint:* Recall that $L[Y|X]$ and $E[Y|X]$ are functions of X and that you need to specify their value as a function of X.]

2. **Number of Ones**

   In this problem, we will revisit dice-rolling, except with conditional expectation.

   (a) If we roll a die until we see a 6, how many ones should we expect to see?

   (b) If we roll a die until we see a number greater than 3, how many ones should we expect to see?

3. **Marbles in a Bag**

   We have r red marbles, b blue marbles and g green marbles to the same bag. If we sample balls, with replacement, until we get 3 red marbles (not necessarily consecutively), how many blue marbles should we expect to see?