

1. [5 pts] Let  $X$  be a random variable on a discrete probability space  $\Omega$  with pmf  $f : \Omega \rightarrow [0, 1]$ . The *expected value of  $X$* , denoted  $E(X)$ , is defined as follows:

$$E(X) := \frac{\sum_{\omega \in \Omega} X(\omega) f(\omega)}{\sum_{\omega \in \Omega} f(\omega)} .$$

2. [10 pts] Suppose the fives and the sixes on two dice are painted over, so no dots show if a five or a six comes up. The painted dice are rolled. Let  $X$  be the total of the faces showing. Find  $E(X)$ .

3. [10 pts] Two regular dice are rolled. Let  $A$  be the event that one comes up on an even number. Let  $B$  be the event that neither a two nor a three is showing on either die. Let  $C$  be the event that the numbers showing are different.

a) Are  $A$  and  $B$  independent? Why or why not?

b) Are  $A$  and  $C$  independent? Why or why not?