

# Assignment 1

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Download all python codes from

<https://github.com/tyagio/AI1103/tree/main/assignment1/codes>

and latex-tikz codes from

<https://github.com/tyagio/AI1103/tree/main/assignment1/assignment1.tex>

$$Pr(X = 2) = \frac{\binom{4}{2}}{\binom{52}{2}} = \frac{6}{26 \times 51}$$

now we know that  $E(X)$  denotes the average or expectation value which means that  $E(X)$  is the weighted average of all values  $X$  can take, each value being weighted by the probability of that particular event/value of  $X$  occurring

i.e  $E(X)$  is given by

$$E(X) = \frac{\sum_{i=0}^2 X \times P(X)}{\sum_{i=0}^2 P(X)}$$

<b>X</b>	0	1	2
<b>P(X)</b>	$\frac{24 \times 47}{26 \times 51}$	$\frac{48 \times 4}{26 \times 51}$	$\frac{6}{26 \times 51}$
<b>X × P(X)</b>	0	$\frac{48 \times 4}{26 \times 51}$	$\frac{12}{26 \times 51}$

$$\Rightarrow E(X) = \frac{48 \times 4}{26 \times 51} + \frac{12}{26 \times 51} = \frac{192 + 12}{26 \times 51} = \frac{2}{13}$$

Final answer  $E(x) = 2/13$  or option 4

## 1 PROBLEM

Suppose that two cards are drawn at random from a deck of cards. Let  $X$  be the number of aces obtained. Then the value of  $E(X)$  is

- 1)  $37/221$
- 2)  $5/13$
- 3)  $1/13$
- 4)  $2/13$

## 2 SOLUTION

Total number of cards = 52 with 4 aces, 48 non-ace's and we need to select 2 cards so  $X$  can be 0, 1 or 2

Case 1:  $X = 0$

$$Pr(X = 0) = \frac{\text{ways of selecting 2 non-ace's}}{\text{total ways of selecting 2 cards}}$$

$$Pr(X = 0) = \frac{\binom{48}{2}}{\binom{52}{2}} = \frac{24 \times 47}{26 \times 51}$$

Case 2:  $X = 1$

$$Pr(X = 1) = \frac{\text{ways of selecting 1 ace and 1 non-ace}}{\text{total ways of selecting 2 cards}}$$

$$Pr(X = 1) = \frac{\binom{4}{1} \times \binom{48}{1}}{\binom{52}{2}} = \frac{48 \times 4}{26 \times 51}$$

Case 3:  $X = 2$

$$Pr(X = 2) = \frac{\text{ways of selecting 2 aces}}{\text{total ways of selecting 2 cards}}$$