Assignment 5

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Question:

Solution:

Let the random variable $X \in \{0, 1, 2\}$ denote the number of aces obtained when two cards are drawn at random from a deck of 52 cards. So, when two cards are drawn at random, the events are described as follows:

Event	Description
$X = 0$	No aces obtained
$X = 1$	1 ace obtained
$X = 2$	2 aces obtained

TABLE I
DESCRIPTION OF EVENTS

$$\Pr(X = 0) = \frac{{}^{4}C_{0}\,{}^{48}C_{2}}{{}^{52}C_{2}} = \frac{1128}{1326} \tag{1}$$

$$\Pr(X = 1) = \frac{{}^{4}C_{1}\,{}^{48}C_{1}}{{}^{52}C_{2}} = \frac{192}{1326} \tag{2}$$

$$\Pr(X = 2) = \frac{{}^{4}C_{2}\,{}^{48}C_{0}}{{}^{52}C_{2}} = \frac{6}{1326} \tag{3}$$

The probability distribution is as follows:

$$E(X) = \sum_{i=1}^{n} x_i \times \Pr(x_i) \tag{4}$$

$$= 0 \times \frac{1128}{1328} + 1 \times \frac{192}{1328} + 2 \times \frac{6}{1326} \tag{5}$$

$$= \frac{204}{1326} \tag{6}$$

$$= \boxed{\frac{2}{13}} \tag{7}$$