

(14) total.

Name: _____ Section: (day/time) _____

AMS5 - Quiz 2
Thursday 28th January, 2016

A standard deck of cards contains 52 cards, divided into four suits (hearts, clubs, diamonds, spades). Each suit has the cards 2, 3, ..., 10, jack, queen, king, ace.

1. A deck is shuffled and two cards are dealt.

(a) Find the chance that the second card is a heart, given that the first card is a heart.

12 hearts left, 51 positions for them
chance is $\frac{12}{51}$

(b) Find the chance that the first card is a heart and the second card is a heart.

1st card is H with chance $\frac{13}{52}$
 $P(1^{st} + 2^{nd} \text{ are both H}) = P(1^{st} \text{ is H}) \times P(2^{nd} \text{ is H} | 1^{st} \text{ is H}) = \frac{13}{52} \times \frac{12}{51}$

2. A coin is tossed 3 times.

(a) What is the chance of getting 3 heads?

1 $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

(b) What is the chance of not getting 3 heads?

1 $1 - \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

(c) What is the chance of getting at least 1 tail?

1 \equiv prob. of not getting 3 H
 $= 1 - \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

(d) What is the chance of getting at least 1 head?

1 $=$ prob of not getting 3 T
 $= 1 - \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

[TURN OVER]

⑥

3. A deck of cards is shuffled. True or False, and explain briefly.

$\frac{1}{2} + \frac{1}{2}$

(a) The chance that the top card is the jack of clubs equals $1/52$. True
there is one JC, it can be in any of the 52 positions
we're interested in one position (top one)
 $\Rightarrow \text{prob} = 1/52$

$\frac{1}{2} + \frac{1}{2}$

(b) The chance that the bottom card is the jack of diamonds equals $1/52$. True
similar reasoning to (a)

$\frac{1}{2} + \frac{1}{2}$

(c) The chance that the top card is the jack of clubs or the bottom card is the jack of diamonds equals $2/52$. False

A - top card is JC
B - bot. card is JD.

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
 $1/52 + 1/52 - \text{which is non zero} \dots$ events are not mutually exclusive

$\frac{1}{2} + \frac{1}{2}$

(d) The chance that the top card is the jack of clubs or the bottom card is the jack of clubs equals $2/52$. True

there are 2 positions for the JC that we are interested in out of the 52 possible positions

$\frac{1}{2} + \frac{1}{2}$

(e) The chance that the top card is the jack of clubs and the bottom card is the jack of diamonds equals $1/52 \times 1/52$. False

if top card is JC, there are only 51 remaining spots for JD

$\frac{1}{2} + \frac{1}{2}$

(f) The chance that the top card is the jack of clubs and the bottom card is the jack of clubs equals $1/52 \times 1/52$. False

prob is zero, the JC cannot be in two places at once.

②

4. The chance of A is $1/4$; the chance of B is $1/10$. True or False, and explain:

$\frac{1}{2} + \frac{1}{2}$

(a) If A and B are independent, they must also be mutually exclusive. False

~~prob~~ A and B can happen together.

(b) If A and B are mutually exclusive, they cannot be independent. True

$\frac{1}{2} + \frac{1}{2}$

knowing that A has happened fixes the prob. of B happening (to zero)