Answer on Question #44238 – Math – Statistics and Probability

Question:

Of 10,000 students at a college, 2,500 have a Mastercard (M), 4,000 have a VISA (V), and 1,000 have both.

a. Find the probability that a randomly selected student

(1) Has a Mastercard.

(2) Has a VISA.

(3) Has both credit cards.

b. Construct and fill in a contingency table summarizing the credit card data. Employ the following pairs of events: M and _M , V and _ . ¯ V¯

c. Use the contingency table to find the probability that a randomly selected student

(1) Has a Mastercard or a VISA.

(2) Has neither credit card.

(3) Has exactly one of the two credit cards.

Solution.

a. (1) The probability that a randomly selected student has a Mastercard is: $\frac{2500}{10000} = \frac{1}{4} = 0.25$

Answer. 0.25

(2) The probability that a randomly selected student has a VISA is: $\frac{4000}{10000} = \frac{2}{5} = 0.4$

Answer. 0.4

(3) The probability that a randomly selected student has both credit cards is: $\frac{1000}{10000} = \frac{1}{10} = 0.1$

Answer. 0.1

b. A contingency table summarizing the credit card data:

	Students which have Visa	Students which have not Visa	Totals
Students which have Mastercard	1000	1500	2500
Students which have not Mastercard	3000	4500	7500
Totals	4000	6000	10000

c. Use the contingency table to find

(1) The probability that a randomly selected student has a Mastercard or a VISA is:
$\frac{1000+1500+3000}{10000} = \frac{5500}{10000} = 0.55$

Answer. 0.55

(2) The probability that a randomly selected student has neither credit card is: $\frac{4500}{10000} = 0.45$

Answer. 0.45

(3) The probability that a randomly selected student has exactly one of the two credit cards is:
$\frac{3000+1500}{10000} = 0.45$

Answer. 0.45