

11.2.1: Mutually Exclusive Events and the Addition Rule (Exercises)

SECTION 11.2 PROBLEM SET: MUTUALLY EXCLUSIVE EVENTS AND THE ADDITION RULE

Determine whether the following pair of events are mutually exclusive.

1) $A = \{\text{A person earns more than \$25,000}\}$ $B = \{\text{A person earns less than \$20,000}\}$	2) A card is drawn from a deck. $C = \{\text{It is a King}\}$ $D = \{\text{It is a heart}\}$.
3) A die is rolled. $E = \{\text{An even number shows}\}$ $F = \{\text{A number greater than 3 shows}\}$	4) Two dice are rolled. $G = \{\text{The sum of dice is 8}\}$ $H = \{\text{One die shows a 6}\}$
5) Three coins are tossed. $I = \{\text{Two heads come up}\}$ $J = \{\text{At least one tail comes up}\}$	6) A family has three children. $K = \{\text{First born is a boy}\}$ $L = \{\text{The family has children of both sexes}\}$

Use the Addition Rule to find the following probabilities.

7) A card is drawn from a deck. Events C and D are: $C = \{\text{It is a king}\}$ $D = \{\text{It is a heart}\}$ Find $P(C \text{ or } D)$.	8) A die is rolled. The events E and F are: $E = \{\text{An even number shows}\}$ $F = \{\text{A number greater than 3 shows}\}$ Find $P(E \text{ or } F)$.
9) Two dice are rolled. Events G and H are: $G = \{\text{The sum of dice is 8}\}$ $H = \{\text{Exactly one die shows a 6}\}$ Find $P(G \text{ or } H)$.	10) Three coins are tossed. Events I and J are: $I = \{\text{Two heads come up}\}$ $J = \{\text{At least one tail comes up}\}$ Find $P(I \text{ or } J)$.
11) At a college, 20% of the students take Finite Mathematics, 30% take Statistics and 10% take both. What percent of students take Finite Mathematics or Statistics?	12) This quarter, there is a 50% chance that Jason will pass Accounting, a 60% chance that he will pass English, and 80% chance that he will pass at least one of these two courses. What is the probability that he will pass both Accounting and English?

Questions 13 - 20 refer to the following: The table shows the distribution of Democratic and Republican U.S by gender in the 114th Congress as of January 2015.

	MALE(M)	FEMALE(F)	TOTAL
DEMOCRATS (D)	30	14	44
REPUBLICANS(R)	48	6	54
OTHER (T)	2	0	2
TOTALS	80	20	100

Use this table to determine the following probabilities.

13) $P(M \text{ and } D)$	14) $P(F \text{ and } R)$
15) $P(M \text{ or } D)$	16) $P(F \text{ or } R)$
17) $P(Mc \text{ or } R)$	18) $P(M \text{ or } F)$
19) Are the events F, R mutually exclusive? Use probabilities to support your conclusions.	20) Are the events F, T mutually exclusive? Use probabilities to support your conclusion.

SECTION 11.2 PROBLEM SET: MUTUALLY EXCLUSIVE EVENTS AND THE ADDITION RULE

Use the Addition Rule to find the following probabilities.

21) If $P(E) = .5$, $P(F) = .4$, E and F are mutually exclusive, find $P(E \text{ and } F)$.	22) If $P(E) = .4$, $P(F) = .2$, E and F are mutually exclusive, find $P(E \text{ or } F)$.
23) If $P(E) = .3$, $P(E \text{ or } F) = .6$, $P(E \text{ and } F) = .2$, find $P(F)$.	24) If $P(E) = .4$, $P(F) = .5$, $P(E \text{ or } F) = .7$, find $P(E \text{ and } F)$.
25) In a box of assorted cookies, 36% of cookies contain chocolate and 12% of cookies contain nuts. 8% of cookies have both chocolates and nuts. Sean is allergic to chocolate and nuts. Find the probability that a cookie has chocolate chips or nuts (he can't eat it).	26) At a college, 72% of courses have final exams and 46% of courses require research papers. 32% of courses have both a research paper and a final exam. Let F be the event that a course has a final exam and R be the event that a course requires a research paper. Find the probability that a course requires a final exam or a research paper.

Questions 25 and 26 are adapted from *Introductory Statistics from OpenStax* under a *creative Commons Attribution 3.0 Unported License*, available for download free at cnx.org/content/col11562/latest

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