Tasks 07-02 - Basic Probability

Section 07: Probability & Statistics

Problem 1: Sample Spaces (x)

Define the sample space for each experiment:

a) Rolling a six-sided die
b) Flipping two coins
c) Drawing a card from a standard deck and noting its suit
d) A customer rating satisfaction on a scale of 1-5

Problem 2: Basic Probability Calculations (x)

A fair six-sided die is rolled. Find:

a) $P(\text{rolling a } 4)$
b) $P(\text{rolling an even number})$
c) $P(\text{rolling greater than } 4)$
d) $P(\text{rolling a } 7)$
e) $P(\text{not rolling a } 6)$

Problem 3: Addition Rule (x)

In a class of 100 students: - 45 study German - 35 study French - 15 study both German and French

a) Find $P(\text{German})$
b) Find $P(\text{German or French})$
c) Find $P(\text{neither German nor French})$
d) Find $P(\text{German only})$

Problem 4: Independence (xx)

Two machines operate independently. Machine A works 95% of the time, Machine B works 90% of the time.

a) Find $P(\text{both work})$
b) Find $P(\text{neither works})$
c) Find $P(\text{at least one works})$
d) Find $P(\text{exactly one works})$

Problem 5: Cards (xx)

A card is drawn from a standard 52-card deck. Find:

a) $P(\text{Ace})$

b) $P(\text{Heart})$
c) $P(\text{Ace or Heart})$
d) $P(\text{Face card})$ (Jack, Queen, King)
e) Are “Ace” and “Heart” mutually exclusive? Independent?

Problem 6: Business Application (xx)

A company surveyed 500 customers: - 320 are satisfied with the product - 280 are repeat customers - 200 are satisfied AND repeat customers

a) Find $P(\text{Satisfied})$
b) Find $P(\text{Satisfied or Repeat})$
c) Find $P(\text{Satisfied but not Repeat})$
d) Are satisfaction and repeat status independent?

Problem 7: Quality Control (xxx)

A factory produces items with a 3% defect rate. A sample of 5 items is randomly selected.

a) Are these selections independent? Why or why not?
b) Find $P(\text{all 5 are good})$
c) Find $P(\text{at least one is defective})$
d) Find $P(\text{exactly one is defective})$