MATH440 PProblems 1

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Problem set: 2,3,7,11, 18, 19, 20, 24, 28,29 32, 37, 40

1   2.2 Practice Problems

Problem 2.2.2
Three dice are tossed, one red, one blue, and one green . What outcomes make up the event A that the sum of the three faces showing equals 5?

$$A = \{(1,1,3),(1,2,2),(1,3,1),(2,1,2),(2,2,1),(3,1,1)\}$$

Problem 2.2.3
An urn contains six chips numbered 1 through 6. Three are drawn out. What outcomes are in the vent "Second smallest ship is 3"? Assume order is not relevant.

$$A = \{(6,3,1),(5,3,1),(4,3,1),(6,3,2),(5,3,2),(4,3,2)\}$$

Problem 2.2.7
Let P be the set of right traingles with a 5" hypotenuse and whose height and length are a and b, respectively. Characterize the outcomes in P.

$$P = \{(a,b)|a^2 + b^2 = 25, a, b \in \mathbb{R}\}$$
$$P = \{(3,4),(4,3)\}$$

Problem 2.2.11
A woman has her purse snatched by two teenagers. She is subsequently shown a police lineup consisting of five suspects, incuding two perpetrators. What is the sample space associated with the experiment: "Woman picks two suspects out of lineup"? Which outcomes are in

the event A: She makes at least one incorrect identification?

$$S = \{(p_1, i_1), (p_1, i_2), (p_1, i_3), (p_2, i_1), (p_2, i_2), (p_2, i_3), (i_1, i_2), (i_1, i_3), (i_2, i_3), (p_1, p_2)\}$$

Where p is perp and i is innocent

$$A = \{(p_1, i_1), ..., (p_1, i_k), (p_2, i_1), ..., (p_1, i_k), (i_1, i_2), (i_1, i_3), (i_2, i_3)\}k \in [2, 3]$$

Problem 2.2.18 Find $A \cap B \cap C$ if $A = \{x | 0 \le x \le 4\}, B = \{x | 2 \le x \le 6\}, C = \{x | x \in \mathbb{Z}\}$

$$A = \{0, 1, 2, 3, 4\}$$
$$B = \{2, 3, 4, 5, 6\}$$
$$A \cap B = \{2, 3, 4\}$$
$$(A \cap B) \cap C = \{2, 3, 4\}$$

Problem 2.2.19 An Electronic system has four components divided into two pairs. The two components of each pair are wired in parallel; the two pairs are wired in series. Let A_{ij} denote the event " ith compontnt in jth pair fails", i = 1,2, j=1,2. Let A be the event System fails write A in terms of the A_{ij}s

$$A = (A_{11} \cap A_{21}) \cap (A_{12} \cap A_{22})$$

Problem 2.2.20 Define: $A = \{x | 0 \le x \le 1\}, B = \{x | 0 \le x \le 3\}, C = \{x | -1 \le x \le 2\}$.
Draw Diagrams for each.
Tikz Skills still pending:

Problem 2.2.24 Let $A_1, A_2, ..., A_k$ be any set of events defined on a sample space S. What outcomes belong to the event:

$$A = (A_1 \cup A_2 \cup ... \cup A_k) \cup (A_1^C \cap A_2^C \cap ... \cap A_k^C)$$

$$A = (A_1 \cup A_2 \cup ... \cup A_k) \cup (A_1 \cap A_2 \cap ... \cap A_k)^C = S\textbf{The entire Sample Space}$$

Problem 2.2.28 Let events A and B and sample S be defined as the following intervals:

$$S = \{x | 0 \le x \le 10\}$$
$$A = \{x | 0 < x < 5\}$$
$$B = \{x | 3 \le x \le 7\}$$

' Characterize the following:

$$A = \{x|0 < x < 5\} = \{x|1 \leq x \leq 4\}$$
$$a)A^C$$
$$A^C = \{0, 6, 7, 8, 9, 10\}$$

$$b)A \cap B$$
$$A \cap B = \{3, 4\}$$

$$c)A \cup B$$
$$A \cup B = \{1, 2, 3, 4, 5, 6, 7\}$$

$$d)A \cap B^C$$
$$A \cap B^C = \{1, 2\}$$

$$e)A^C \cup B$$
$$A^C \cup B = \{5, 6, 7\}$$

$$f)A^C \cap B^C$$
$$A^C \cap B^C = \{0, 8, 9, 10\}$$

Problen 2.2.29
A coin is tossed four times and the resulting sequence of heads and. or tails is recorded
Define the events A,B,and C as follows:

A:Exactly two heads appear
B: heads and tails alternate
C: first two tosses are heads

a) **Which two events are disjoint?:** B and C
b) **Which events are subsets** AB.