

Homework #5
Due Su 10/26

Note:

- OW Oppenheim and Wilsky
- SSS Schaum's Signals and Systems
- SPR Schaum's Probability, Random Variables, and Random Processes (2nd edition)

Be sure to show all your work for credit.

1. (SPR 1.85)

A random experiment has sample space $S = \{a, b, c\}$. Suppose that $P(\{a, c\}) = 0.75$ and $P(\{b, c\}) = 0.6$. Find the probabilities of the elementary elements.

2. (SPR 1.86)

Show that

- (a) $P(\bar{A} \cup \bar{B}) = 1 - P(A \cap B)$
- (b) $P(A \cap B) \geq 1 - P(\bar{A}) - P(\bar{B})$
- (c) $P(A \Delta B) = P(A \cup B) - P(A \cap B)$

3. (SPR 1.87)

Let A, B , and C be three events in S . If $P(A) = P(B) = \frac{1}{4}$, $P(C) = \frac{1}{3}$, $P(A \cap B) = \frac{1}{8}$, $P(A \cap C) = \frac{1}{6}$, and $P(B \cap C) = 0$, find $P(A \cup B \cup C)$.

4. (SPR 1.90)

In an experiment consisting of 10 throws of a pair of fair dice, find the probability of the event that at least one double 6 occurs.

5. (SPR 1.94)

An urn contains 8 white balls and 4 red balls. The experiment consisting of drawing 2 balls from the urn without replacement. Find the probability that both balls drawn are white.

6. (SPR 1.97)

Let A and B be two independent events in S . It is known that $P(A \cap B) = 0.16$ and $P(A \cup B) = 0.64$. Find $P(A)$ and $P(B)$.

7. Let A, B , and C be events. Find expressions for the following events:

- (a) Exactly one of the three events occurs.
- (b) Exactly two of the events occur.
- (c) One or more of the events occur.
- (d) Two or more of the events occur.
- (e) none of the events occur.

8. The number U is selected at random from the unit interval. Let the events A and B be: $A =$ “ U differs from $1/2$ by more than $1/4$ ” and $B =$ “ $1 - U$ is less than $1/2$ ”. Find the events:

- (a) $A \cap B$
- (b) $\bar{A} \cap B$
- (c) $A \cup B$