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**SECTION 4.2: BASICS OF PROBABILITY**

**Pr 1.** Determine if the sample space for each experiment is uniform or not.

(a) Selecting a letter at random from the word “skate” and noting the letter.

(b) A standard 30-sided die is rolled and it is noted whether the number is a multiple of 4 or is not a multiple of 4.

**Pr 2.** A card is selected from a well-shuffled standard 52-card deck. Compute each of the following probabilities.

(a)  $P(\text{a 5 is drawn})$

(b)  $P(\text{a red card is drawn})$

(c)  $P(\text{a black Ace is drawn})$

(d)  $P(\text{a card which is not a diamond is drawn})$

(e)  $P(\text{a face card is drawn or spade is drawn})$

**Pr 3.** An experiment consists of rolling a five-sided, noting the number showing uppermost and then spinning a spinner with three equal regions (red, blue, and purple), noting the color. What is the probability that

(a) A 3 is rolled

(b) The spinner lands on a color other than maroon.

(c) An odd number is rolled or the spinner lands on blue.

(d) A number greater than 2 and the spinner does not land on purple.

**Pr 4.** A music store selected 1000 customers at random and surveyed them to determine a relationship between age of purchaser and monthly purchases of cds. The results are given in the table below.

	0	1	2	3	4 or More	<b>Totals</b>
Under 12 (A)	50	60	30	20	10	170
12 - 18 (B)	30	100	90	30	40	290
19 - 25 (C)	70	110	100	30	20	330
Over 25 (D)	100	50	40	10	10	210
<b>Totals</b>	250	320	260	90	80	1000

If a surveyed person is selected at random, compute each of the following.

(a)  $P(C \cap 3)$

(b)  $P(A \cup 1)$

(c)  $P((B \cup D)^c \cap 4)$

**Pr 5.** Is the following probability distribution valid? If valid, does the distribution represent an experiment with uniform sample space?

Outcomes	-3	0	3	6	9
Probability	$\frac{2}{25}$	$\frac{1}{25}$	$\frac{10}{25}$	$\frac{8}{25}$	$\frac{4}{25}$

## SECTION 4.3: RULES OF PROBABILITY

1. Let  $\mathbf{S} = \{s_1, s_2, s_3, s_4\}$  be the sample space for an experiment with the distribution given below.

Outcome	$s_1$	$s_2$	$s_3$	$s_4$
Probability	$\frac{3}{50}$	$\frac{4}{25}$		$\frac{18}{50}$

Let  $A = \{s_1, s_3\}$  and  $B = \{s_1, s_4\}$ .

- (a) Fill in the missing probability in the distribution table.

Determine the following probabilities.

(b)  $P(A)$

(c)  $P(A \cup B)$

(d)  $P((A \cap B)^C)$

2. Let  $A$  and  $B$  be two events of an experiment. Suppose  $P(A) = 0.65$ ,  $P(B) = 0.62$ , and  $P(A \cup B) = 0.84$ . Calculate the following probabilities:

(a)  $P(A^C)$

(b)  $P(A \cap B)$

(c)  $P(A^C \cup B^C)$

SECTION 4.4: PROBABILITY DISTRIBUTIONS

1. The probability distribution for tossing a coin three times and counting the number of tails is given below.

$X$	0	1	2	3
$P(X)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

- (a) Compute the probability that more than one head is tossed.

- (b) Compute the probability that four heads are tossed.

- (c) State the expected number of heads in an experiment where three coins are tossed.

2. You are going on a European vacation and decide to purchase travel insurance on your brand new luggage worth \$1500. The insurance policy will cost \$48. In the event your luggage is damaged to the point of needing duct tape, then you will receive 50% of the value of the luggage. In the event your luggage is lost or stolen, then you will receive 100% of the value of the luggage. According to airline data, the probability of your luggage being damaged and needing duct tape is 1%, while the probability your luggage is lost or stolen is 0.8%. Let  $X$  be the insurance company's net gain or loss on the policy described.

- (a) Create a probability distribution for  $X$ .

- (b) Compute the insurance company's expected profit for this policy.

3. You play a game where a card is drawn from a well-shuffled standard deck of 52 cards, noting the color of the card, and a spinner divided into four equal regions (red, blue, green, and yellow) is spun, noting the color. If the spinner lands on a color other than yellow, you win \$3. If the color of the card is red and the spinner lands on red, you win \$10. Otherwise you lose. Let  $X$  be your winnings.

a. Create a probability distribution for  $X$ .

b. Compute your expected winnings for the game.

c. How much should be charged in order to make the game fair?