

CIS2910 A5 Soln

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1 Discrete Probability

For Questions 1 to 4, use the following Information: A total of 35 teens attended a performing arts camp to train in at least one of three activities: dance, acting, or singing. 15 took dance, 17 took acting, and 19 took singing. 3 took dance and acting only. 5 took acting and singing only. 4 took dance and singing on

Soln: page 566 of Text: Principle of Inclusion / Exclusion, which states that:

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|$$

$$\text{Thus: } 35 = 15 + 17 + 19 - (3 + x + 5 + x + 4 + x) + x \quad \text{Thus } 35 = 39 - 2x \Rightarrow x = 2$$

1. How many teens trained in all three performing arts? **Ans: 2**
2. How many teens took singing only? **Ans: 8**
3. How many teens took dance and acting? **Ans: 5**
4. How many teens took dancing but not acting? **Ans: 10**

2 Discrete Probability

6. Let X be the number of heads obtained when tossing a fair coin 3 times.

- (a) Find $P(X = 2)$. **Ans: ${}_3C_2$**
- (b) Find $P(X = 1)$. **Ans: ${}_3C_1$**
- (c) Find $P(X > 0)$. **Ans: 8 - 1**

7. Let X be the total score when two dice are rolled.

- (a) Find $P(X = 5)$. **Ans: 4/36**
- (b) Find $P(X > 10)$. **Ans: 3/36**
- (c) Find $P(X < 5)$. **Ans: 6/36**

8. The random variable X has the probability distribution shown.

x	1	2	3	4	5
$P(X = x)$	$7c$	$5c$	$4c$	c	$3c$

(a) Use the fact that $\sum P(X = x) = 1$ to find c . **Ans: 0.05**

(b) Find $P(X > 3)$. **Ans: 0.2**

(c) Find $P(1 < X < 4)$. **Ans: 9/20**