

Math 70

Week 3

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1 Problems

Example 1.1. (PSI 1.2.7) In a state lottery, four digits are drawn at random one at a time with replacement from 0 to 9. Suppose that you win if any permutation of your selected integers is drawn. Give the probability of winning if you select

1. 6, 7, 8, 9.

(A) $\frac{24}{10^4}$ (B) $\frac{24}{10 \cdot 9 \cdot 8 \cdot 7}$ (C) $\frac{4}{10 \cdot 9 \cdot 8 \cdot 7}$ (D) $\frac{12}{10^4}$ (E) $\frac{4^4}{10^4}$

2. 6, 7, 8, 8.

(A) $\frac{24}{10^4}$ (B) $\frac{24}{10 \cdot 9 \cdot 8 \cdot 7}$ (C) $\frac{4}{10 \cdot 9 \cdot 8 \cdot 7}$ (D) $\frac{12}{10^4}$ (E) $\frac{4^4}{10^4}$

3. 7, 7, 8, 8.

(A) $\frac{6}{10^4}$ (B) $\frac{6}{10 \cdot 9 \cdot 8 \cdot 7}$ (C) $\frac{4}{10 \cdot 9 \cdot 8 \cdot 7}$ (D) $\frac{12}{10^4}$ (E) $\frac{24}{10^4}$

4. 7, 8, 8, 8.

(A) $\frac{4}{10^4}$ (B) $\frac{24}{10 \cdot 9 \cdot 8 \cdot 7}$ (C) $\frac{4}{10 \cdot 9 \cdot 8 \cdot 7}$ (D) $\frac{12}{10^4}$ (E) $\frac{4^4}{10^4}$

Example 1.2. Random Variable Example Two dice are thrown: D_1 & D_2 . Let random variable X be the sum of numbers facing up. Find $E(X)$.

Example 1.3. Monica throws two dice in a backgammon game. You know that the sum of two dice is 10. What is the probability that one of the dice is 5?

- (A) $\frac{1}{6}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

Example 1.4. On average, how many rolls we need to throw a fair dice to get all 6 outcomes?

- (A) 6 (B) 36 (C) 12 (D) 14.7 (E) $\frac{144}{7}$

Example 1.5. Old Quiz Problem Let a random experiment be the casting of a pair of fair six-sided dice and let X equal the minimum of the two outcomes.

1. Compute the mean of X , $E[X]$.
2. Compute $E[2X + 1]$.

Example 1.6. PSI-2.2.5 Let the random variable X be the number of days that a certain patient needs to be in the hospital. Suppose X has the pmf

$$f(x) = \frac{5-x}{10}, \quad x = 1, 2, 3, 4$$

If the patient is to receive \$200 from an insurance company for each of the first two days in the hospital and \$100 for each day after the first two days, what is the expected payment for the hospitalization? (A) 260 (B) 300 (C) 310 (D) 350 (E) 360