

Solutions to Math 481 Attendance QUIZ for Lecture 3

1. You throw three four-sided fair dice, each with faces labeled with one,two,three, and four pips.

a. Draw the probability function for the ‘total number of pips’.

Sol. of a: Let X be the random variable ‘total number of pips’.

The **universal sets** has $4^3 = 64$ members

$$U := \{(i, j, k) \mid 1 \leq i, j, k \leq 4\} \quad .$$

The possible sums range from 3 to 12.

- for $X = 3$: only $(1, 1, 1)$, so $P(X = 3) = \frac{1}{64}$.
- for $X = 4$: $(1, 1, 2)$, has three permutations, so $P(X = 4) = \frac{3}{64}$.
- for $X = 5$: $(1, 1, 3)$, has three permutations; and $(1, 2, 2)$ has three permutations; so $P(X = 5) = \frac{6}{64}$.
- for $X = 6$: $(1, 1, 4)$ has three permutations; $(1, 2, 3)$ has six permutations; $(2, 2, 2)$ has one permutation; so $P(X = 6) = \frac{10}{64}$.
- for $X = 7$: $(1, 3, 3)$ has three permutations; $(1, 2, 4)$ has six permutations; $(2, 2, 3)$ has three permutations; so $P(X = 7) = \frac{12}{64}$.
- for $X = 8$: $(1, 3, 4)$ has six permutations; $(2, 2, 4)$ has three permutations; $(2, 3, 3)$ has three permutations; so $P(X = 8) = \frac{9}{64}$.
- for $X = 9$: $(1, 4, 4)$, has three permutations; $(2, 3, 4)$ has six permutations; $(3, 3, 3)$ has one permutation, so $P(X = 9) = \frac{10}{64}$.
- for $X = 10$: $(2, 4, 4)$ has three permutations; so $P(X = 10) = \frac{3}{64}$.
- for $X = 11$: $(3, 4, 4)$, has three permutations; so $P(X = 11) = \frac{3}{64}$.
- for $X = 12$: $(4, 4, 4)$ has one permutation; so $P(X = 12) = \frac{1}{64}$.

So the **probability function** is zero everywhere except

$$\begin{aligned} f(3) &= \frac{1}{64} \quad , \quad f(4) = \frac{3}{64} \quad , \quad f(5) = \frac{6}{64} \quad , \quad f(6) = \frac{10}{64} \quad , \\ f(7) &= \frac{12}{64} \quad , \quad f(8) = \frac{9}{64} \quad , \quad f(9) = \frac{10}{64} \quad , \quad f(10) = \frac{3}{64} \quad , \quad f(11) = \frac{3}{64} \quad , \quad f(12) = \frac{1}{64} \quad . \end{aligned}$$

Now you draw it!

b. Draw the cumulative probability function

Sol. of b

$$F(3) = \frac{1}{64} \quad , \quad F(4) = \frac{4}{64} \quad , \quad F(5) = \frac{10}{64} \quad , \quad F(6) = \frac{20}{64} \quad ,$$

$$F(7) = \frac{32}{64} \quad , \quad F(8) = \frac{44}{64} \quad , \quad F(9) = \frac{54}{64} \quad , \quad F(10) = \frac{60}{64} \quad , \quad F(11) = \frac{63}{64} \quad , \quad F(12) = 1 \quad .$$

Now you draw it!