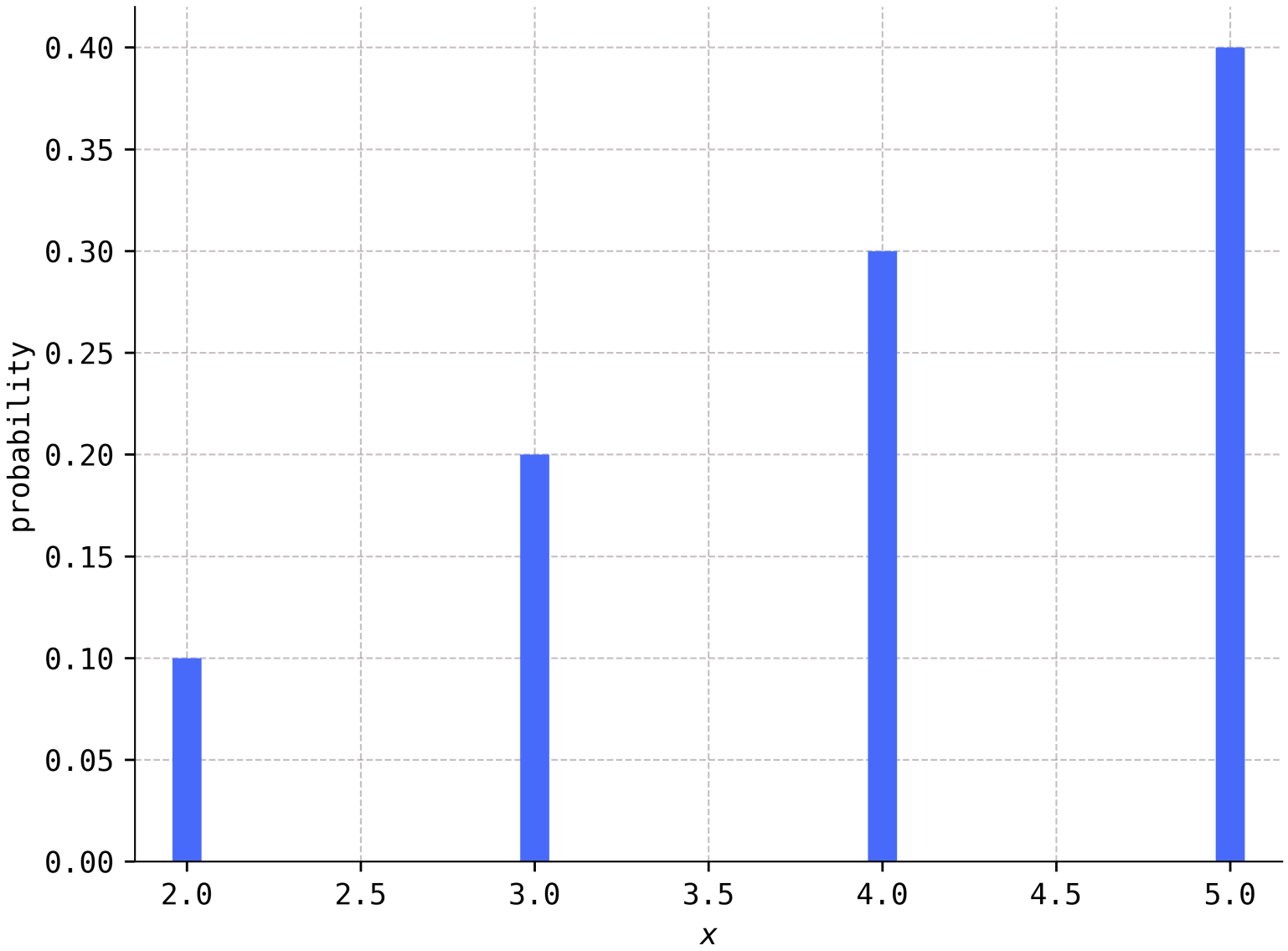
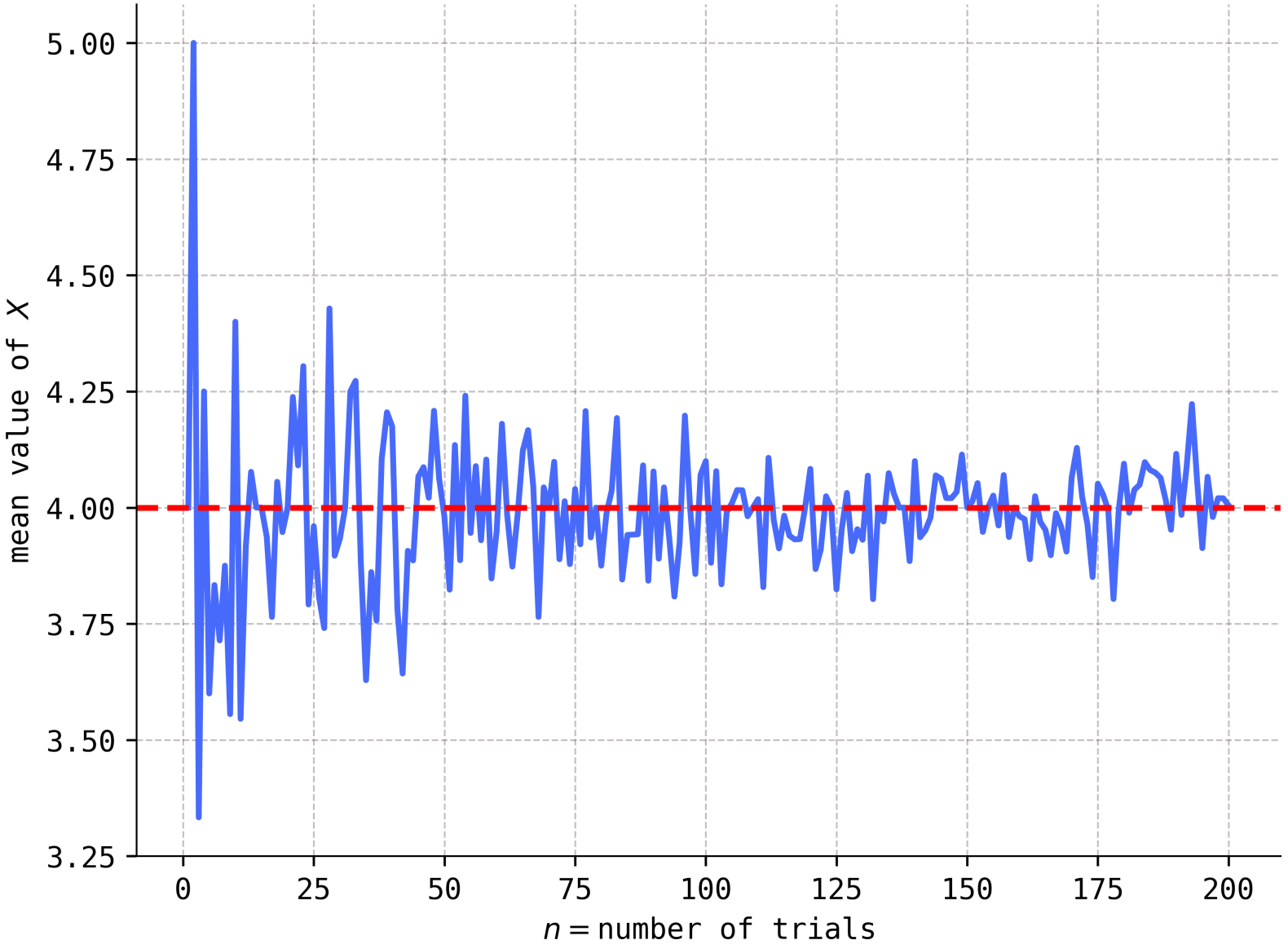
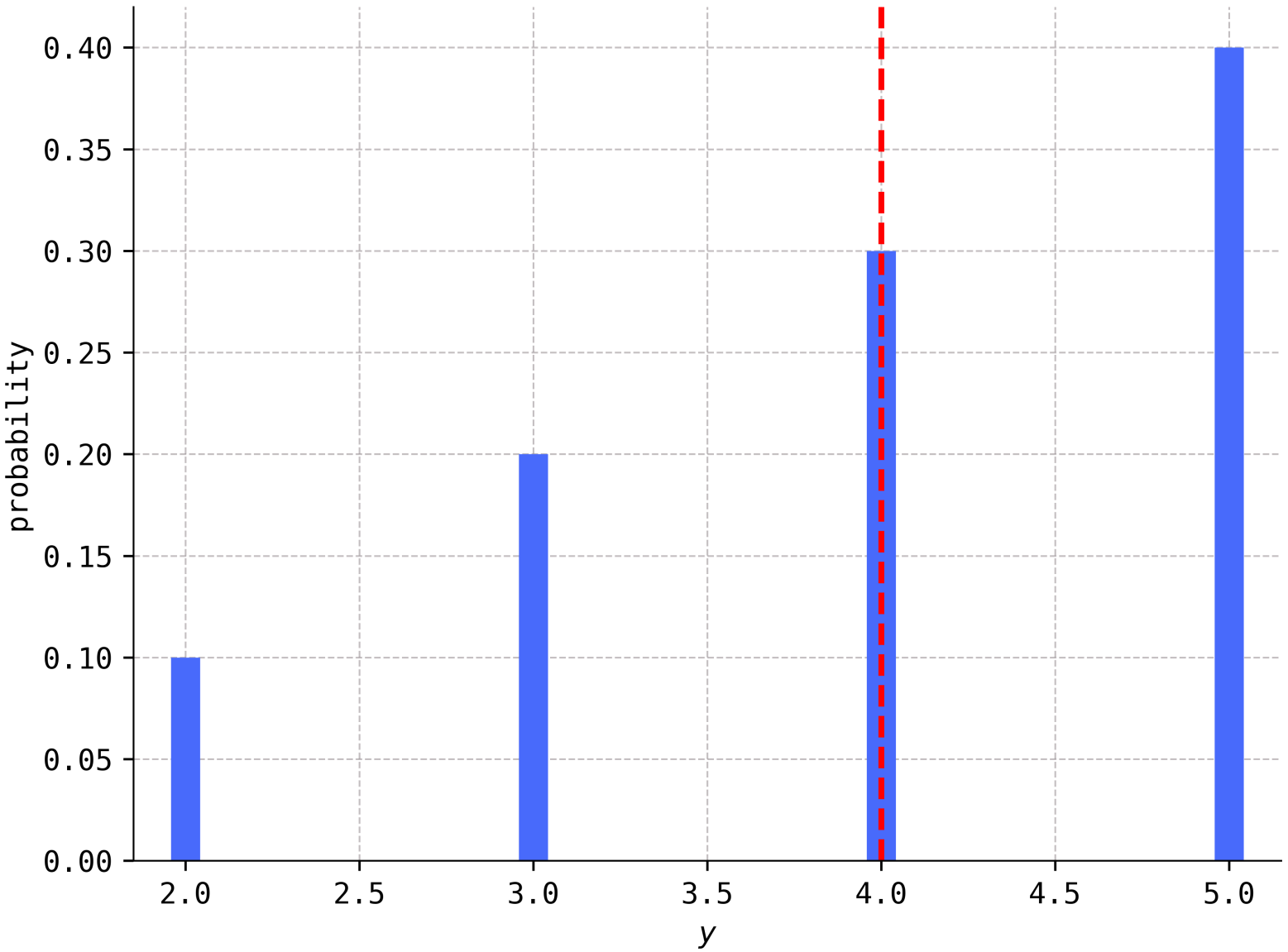
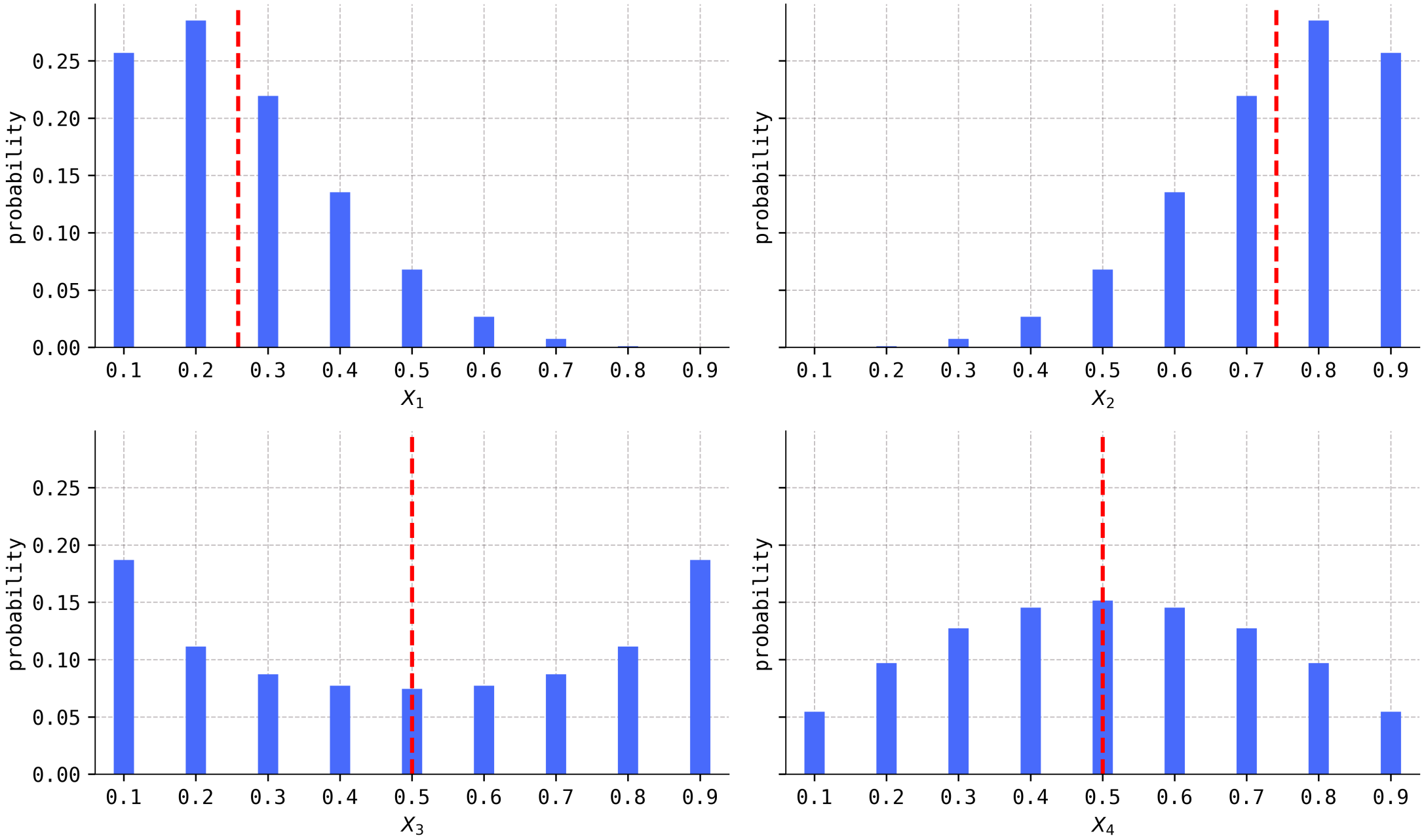
4.5. Expected values


probability
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
2.0
2.5
3.0
3.5
4.0
4.5
5.0
x


5.00
4.75
4.50
4.25
4.00
3.75
3.50
3.25
mean value of X
0
25
50
75
100
125
150
175
200
n = number of trials


probability
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
2.0
2.5
3.0
3.5
4.0
4.5
5.0
y


probability
0.25
0.20
0.15
0.10
0.05
0.00
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
X_1
probability
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
X_2
probability
0.25
0.20
0.15
0.10
0.05
0.00
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
X_3
probability
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
X_4

Definition 4.6

Let X be a random variable.

- If X is discrete with probability mass function $p(x)$, then its *expected value*, denoted $E(X)$, is the sum

$$E(X) = \sum_{x \in \mathbb{R}} x \cdot p(x). \tag{4.3}$$

- If X is continuous with probability density function $f(x)$, then its *expected value*, denoted $E(X)$, is the integral

$$E(X) = \int_{\mathbb{R}} x \cdot f(x) \, \mathrm{d}x.$$

In both cases, the expected value $E(X)$ is also often called the *mean value* of X (or just *mean*) and denoted μ_X or just μ.

Problem Prompt

Do problems 11-15 on the worksheet.