

Variance of one die

- Roll a single six-sided die, call it X .
- Then

$$\mathbb{E}[X] = \frac{1 + 2 + 3 + 4 + 5 + 6}{6} = \frac{21}{6} = \text{frac}72.$$

- Also

$$\mathbb{E}[X^2] = \frac{1 + 4 + 9 + 16 + 25 + 36}{6} = \frac{91}{6}.$$

- Then

$$V(X) = \frac{91}{6} - \left(\frac{7}{2}\right)^2 = \frac{91}{6} - \frac{49}{4} = \frac{364 - 294}{24} = \frac{70}{24} = \frac{35}{12}.$$