4.9. Linearity of expectation, part 1

🔔 Theorem 4.3 ("Weak" Linearity of Expectations)

Let X be a discrete or continuous random variable, let $y = g_1(x)$ and $y = g_2(x)$ be two real-valued functions, and let $c \in \mathbb{R}$ be a constant. Then:

$$E(g_1(X) + g_2(X)) = E(g_1(X)) + E(g_2(X)),$$
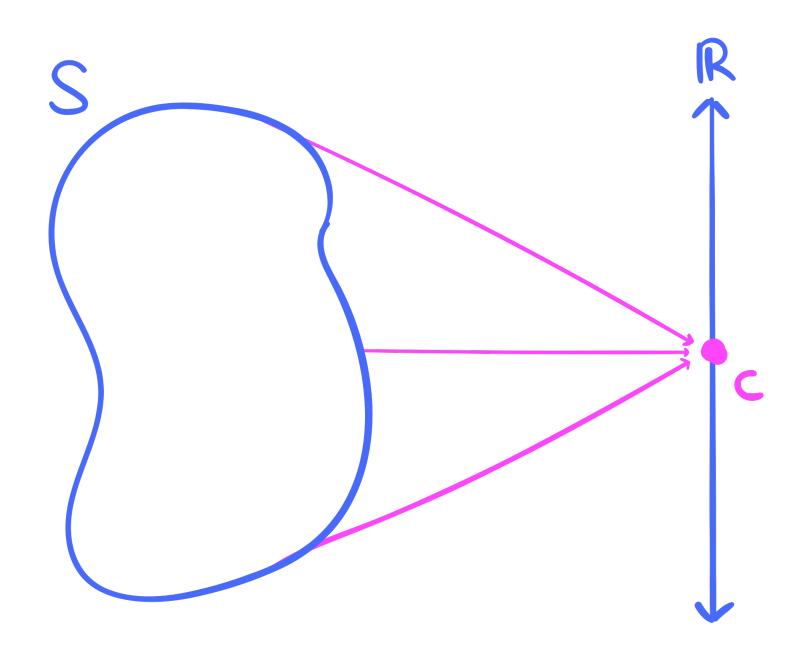
and

$$E(cX) = cE(X).$$

Theorem 4.2 (Linearity of Expectations)

Let X and Y be two random variables and let $c \in \mathbb{R}$ be a constant. Then:

$$E(X + Y) = E(X) + E(Y), \tag{4.14}$$

and

$$E(cX) = cE(X). \tag{4.15}$$

Theorem 4.4 (Expectations of Constants)

Let $c \in \mathbb{R}$ be a constant, viewed as a constant random variable. Then $E(c) = c$.

Problem Prompt

Do problem 20 on the worksheet.