

$$\begin{aligned} E(X^2) &= \int_{-d}^{+d} x^2 f(x) dx = \int_{-d}^a 0 dx + \int_a^b \frac{x^2}{b-a} dx + \int_b^{+d} 0 dx \\ &= \frac{1}{b-a} \left[ \frac{x^3}{3} \right]_a^b = \frac{b^3 - a^3}{3(b-a)} \\ &= \frac{(b-a)(b^2 + a^2 + ab)}{3(b-a)} \end{aligned}$$

$$\begin{aligned} \text{Var } X &= E(X^2) - (E(X))^2 \\ &= \frac{a^2 + b^2 + ab}{3} - \frac{(a+b)^2}{4} \\ &= \frac{4(a^2 + b^2 + ab) - 3(a^2 + b^2 + 2ab)}{12} \\ &= \frac{a^2 + b^2 - 2ab}{12} = \frac{(a-b)^2}{12} \end{aligned}$$

$$\sigma_X = \frac{b-a}{\sqrt{12}}$$