St. Petersburg paradox

X … počet "orlů" dokud nepadne "hlava", $X \in \{0, 1, 2, \dots\}$

$X \sim Ge(1/2)$

Výhra …. 2^X Kč

? kolik by měla stát hra, aby byl nulový součet?

$P(X=k) = \frac{1}{2^k} \cdot \frac{1}{2}$

$$EX = \sum_{k=0}^{\infty} k \cdot p(k) = \frac{1}{2} \sum_{k=0}^{\infty} k \cdot \frac{1}{2^k} = \dots = 2$$

;

$$\boxed{Y = 2^X}$$

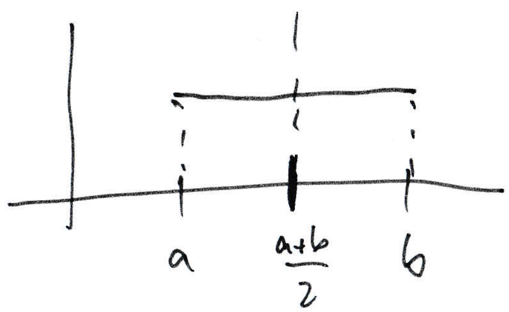
$$EY = \sum_{k=0}^{\infty} 2^k \cdot p(k) = \frac{1}{2} \sum_{k=0}^{\infty} 2^k \cdot \frac{1}{2^k} = \frac{1}{2} \sum_{k=0}^{\infty} 1 = \underline{\underline{\infty}}$$

max = 40

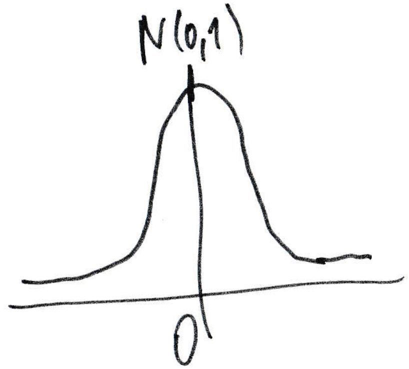
$$\frac{1}{2} \sum_{k=0}^{\cancel{40}\, 39} 2^k \cdot \frac{1}{2^k} = \frac{40}{2} = 20 \text{ Kč}$$

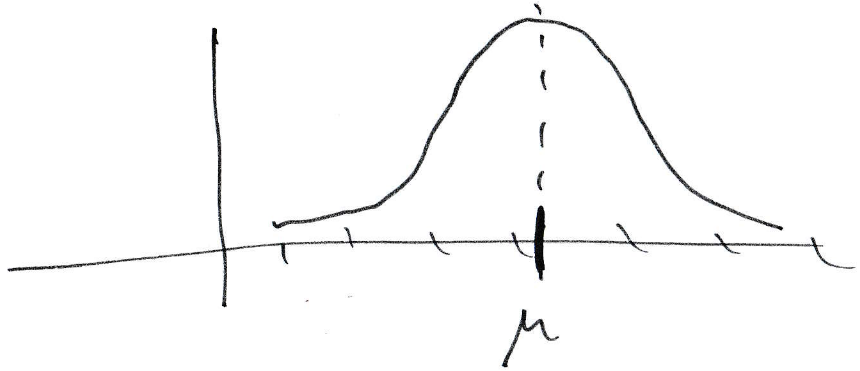
$$\infty = E(2^X) \neq 2^{E(X)} = 4$$

Pr. 6. $X \sim R_0(a,b)$



Pr. 7.

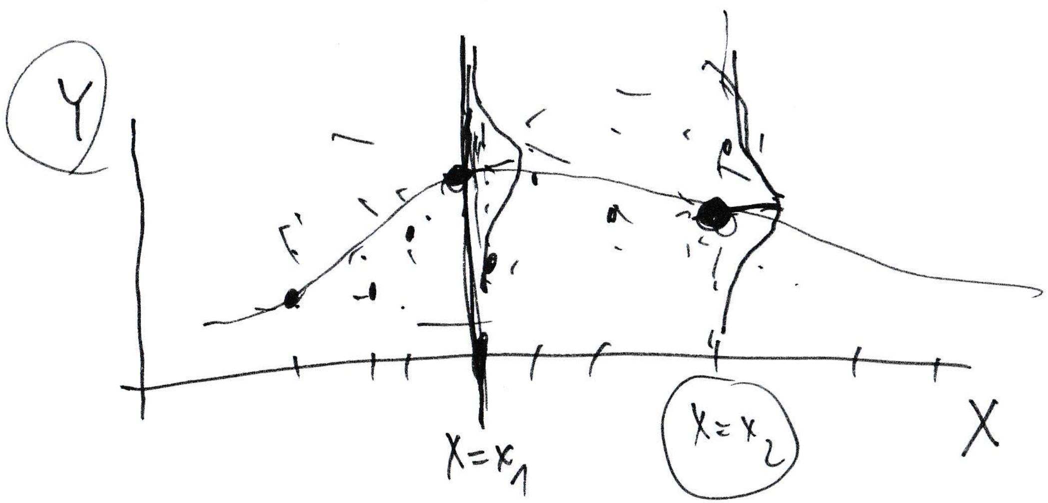




D.V.6. $E\left(\prod_{i=1}^{n} X_i\right) = E\left(g(x_1,\dots,x_n)\right) = \int_{\mathbb{R}^n} \underbrace{g(x_1,\dots,x_n)}_{x_1 \cdot \ldots \cdot x_n} \, dF(x_1,\dots,x_n)$

$F(x_1,\dots,x_n) = F_{X_1}(x_1) \cdot \ldots \cdot F_{X_n}(x_n)$

$= \underbrace{\int_{\mathbb{R}} x_1 \cdot dF_{X_1}(x_1)}_{EX_1} \cdot \underbrace{\int_{\mathbb{R}} x_2 \, dF_{X_2}(x_2)}_{EX_2} \cdot \ldots \cdot \underbrace{\int_{\mathbb{R}} x_n \, dF_{X_n}(x_n)}_{EX_n}$


Y
X
X=x1
X=x2