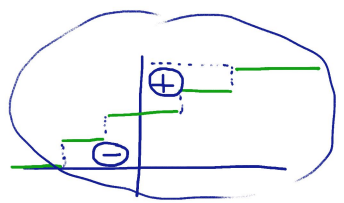
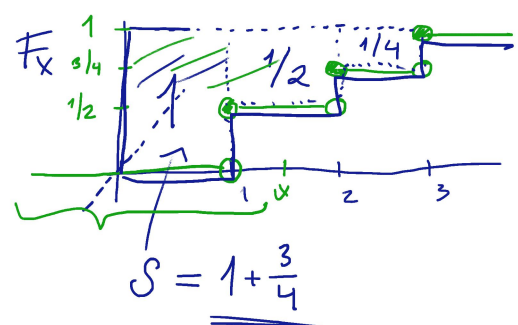
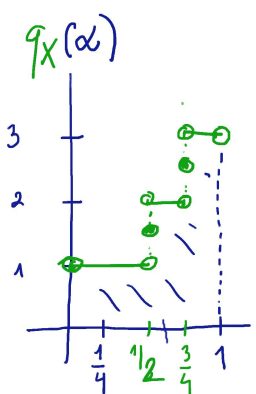


2

x	1	2	3
$P[X=x]$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$



$$EX = \frac{1}{2} \cdot 1 + \frac{1}{4} \cdot 2 + \frac{1}{4} \cdot 3$$

$$= \frac{1}{2} + \frac{2}{4} + \frac{3}{4} = \frac{4}{4} = 1.45$$

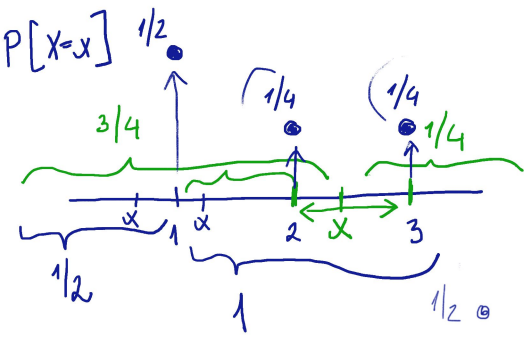
$$DX = E(X^2) - (EX)^2$$

$$E(X^2) = \frac{1}{2} \cdot 1^2 + \frac{1}{4} \cdot 2^2 + \frac{1}{4} \cdot 3^2$$

$$= \frac{1}{2} + \frac{4}{4} + \frac{9}{4} = \frac{15}{4}$$

$$\sigma_X^2 = DX = \frac{15}{4} - \left(\frac{4}{4}\right)^2 = \frac{60 - 49}{16} = \frac{11}{16}$$

$$\sigma_X = \sqrt{DX} = \sqrt{\frac{11}{16}}$$

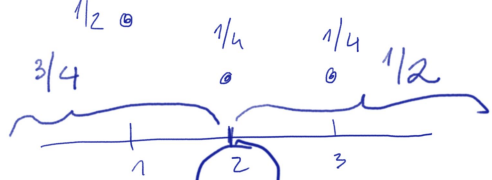


$q_X(\frac{1}{4}) = 1$ DOLNI KVARTIL

$q_X(\frac{3}{4}) = 2.5$ HORNÍ KVARTIL

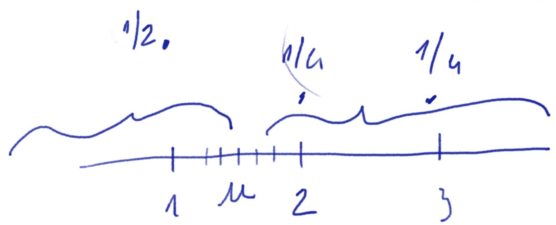
$q_X(\frac{1}{2}) = 1.5$ MEDIAN

$$EX = \int_0^1 q_X(x) dx$$

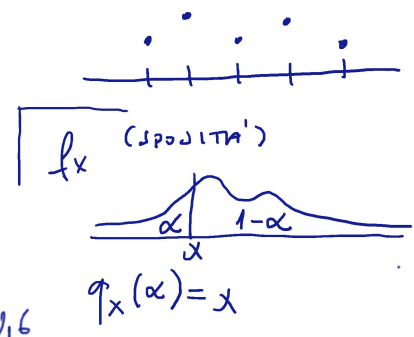


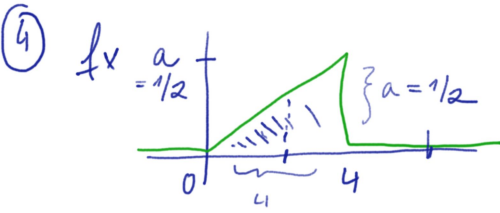
$q_X(0.16) = \mu = 2$ $(-\infty, \mu)$ also $\frac{0.16}{0.4}$

(μ, ∞)



$q_X(0.15) = \mu$





$$S = \frac{a \cdot 4}{2} = 2a = 1$$

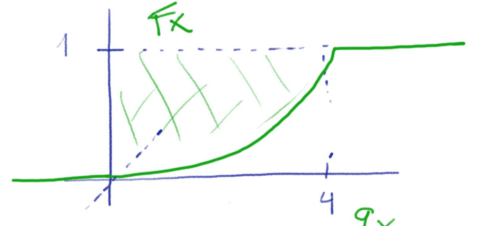
$$a = 1/2$$

$$\int_0^x \frac{u}{8} du = \frac{1}{8} \frac{1}{2} [u^2]_0^x$$

$$= \frac{x^2}{16}$$

$$f_X(x) = \begin{cases} 0 & x \in (-\infty, 0) \\ \frac{x}{8} & 0, 4 \\ 0 & 4, \infty \end{cases}$$

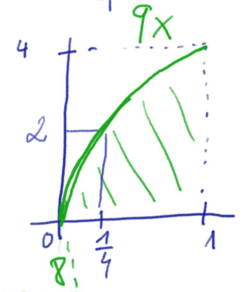
$$F_X(x) = \begin{cases} 0 & (-\infty, 0) \\ \frac{x^2}{16} & (0, 4) \\ 1 & (4, \infty) \end{cases}$$



$$EX = \int_{-\infty}^{\infty} x \cdot f_X(x) dx = \int_0^4 x \cdot \frac{x}{8} dx = \frac{1}{8} \frac{1}{3} [x^3]_0^4 = \frac{4 \cdot 4 \cdot 4 \cdot 2}{8 \cdot 3} = \frac{8}{3}$$

$$DX = E(X^2) - (EX)^2 = 8 - \left(\frac{8}{3}\right)^2 = \frac{72 - 64}{9} = \frac{8}{9} \dots \sigma_X = \sqrt{\frac{8}{9}}$$

$$E(X^2) = \int_{-\infty}^{\infty} x^2 \cdot f_X(x) dx = \int_0^4 x^2 \cdot \frac{x}{8} dx = \frac{1}{8} \frac{1}{4} [x^4]_0^4 = \frac{4 \cdot 4 \cdot 4 \cdot 4 \cdot 2}{8 \cdot 4} = 8$$



$$\int_0^4 1 dx - \int_0^4 \frac{x^2}{16} dx = 4 - \frac{1}{16} \frac{1}{3} [x^3]_0^4 = 4 - \frac{4 \cdot 4 \cdot 4}{16 \cdot 3} = \frac{12}{3} - \frac{4}{3} = \frac{8}{3}$$

$$\int_0^1 4\sqrt{\alpha} d\alpha = 4 \frac{2}{3} [\alpha^{3/2}]_0^1 = \frac{8}{3}$$

= 1

$$y = \frac{x^2}{16}$$

$$16y = x^2$$

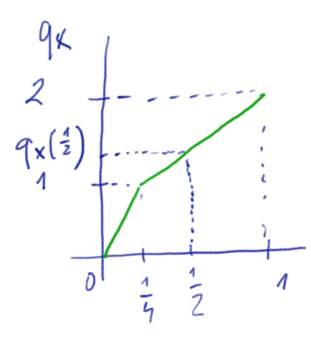
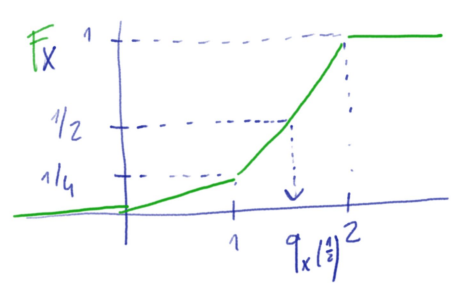
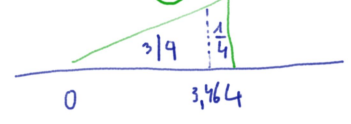
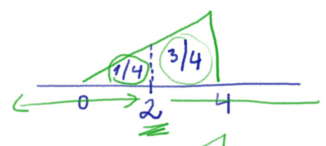
$$\oplus 4\sqrt{y} = x$$

$$q_X(\alpha) = 4\sqrt{\alpha}$$

$$q_X\left(\frac{1}{4}\right) = 4\sqrt{\frac{1}{4}} = \frac{4}{2} = 2$$

$$q_X\left(\frac{1}{2}\right) = 4\sqrt{\frac{1}{2}} \doteq 2,83$$

$$q_X\left(\frac{3}{4}\right) = 4\sqrt{\frac{3}{4}} \doteq 3,46$$



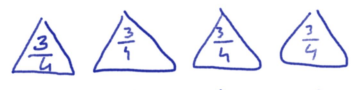
$$q_X\left(\frac{1}{2}\right)$$

4x 

X... počet jednotek

$$\binom{4}{2} = \frac{4 \cdot 3}{2 \cdot 1} = 6$$

$$P[X=0] = \binom{4}{0} \left(\frac{3}{4}\right)^4 = \frac{81}{256}$$



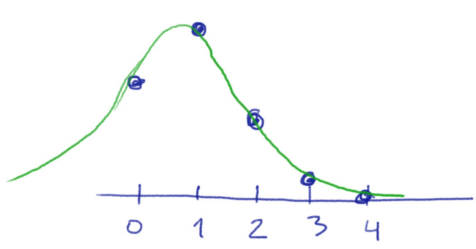
$$P[X=1] = \binom{4}{1} \cdot \frac{1}{4} \cdot \left(\frac{3}{4}\right)^3 = \frac{108}{256}$$



$$P[X=2] = \binom{4}{2} \left(\frac{1}{4}\right)^2 \cdot \left(\frac{3}{4}\right)^2 = \frac{54}{256}$$

$$P[X=3] = \binom{4}{3} \frac{1}{4} \cdot \left(\frac{3}{4}\right)^3 = \frac{12}{256}$$

$$P[X=4] = \binom{4}{4} \left(\frac{1}{4}\right)^4 = \frac{1}{256}$$



$$P[X=x] = \binom{4}{x} \left(\frac{1}{4}\right)^x \left(\frac{3}{4}\right)^{4-x}$$

m kostek

$$EX = 4 \cdot \frac{1}{4} = 1 \quad D = 4 \cdot \frac{1}{4} \cdot \frac{3}{4} = \frac{3}{4}$$

q

$$P[X=x] = \binom{m}{x} q^x (1-q)^{m-x}$$

$$EX = mq \quad D = mq(1-q)$$

10) Zoo slepic, 5 vajec / hden, 1,5% se vejce rozbije

$$m = 1000$$

$$q = 0,015$$

$$P[X=x] = \binom{1000}{x} 0,015^x 0,985^{1000-x}$$

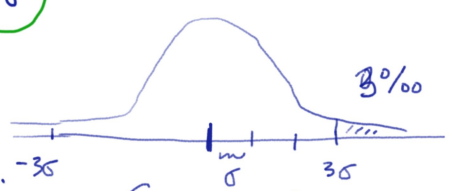
$$P[X=10] = \binom{1000}{10} 0,015^{10} 0,985^{990} \approx 0,0482$$

$$EX = mq = 1000 \cdot 0,015 = 15$$

$$DX = 1000 \cdot 0,015 \cdot 0,985 \approx 14,78$$

$$DX = mq(1-q)$$

$$EX = \lambda \rightarrow 1$$



11) za hden se rozbije priemerne lambda = 15 vajec (Poisson)

$$P[X=x] = \frac{\lambda^x}{x!} e^{-\lambda}$$

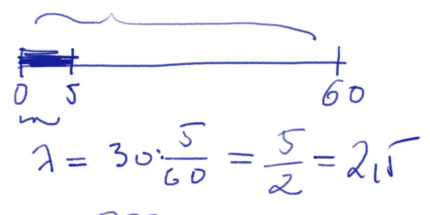
$$EX = \lambda = 15$$

$$DX = \lambda = 15$$

$$P[X=10] = \frac{15^{10}}{10!} e^{-15} \approx 0,0486$$

12) lambda = 30 hostu behem 1h

$$P[X=x] = \frac{30^x}{x!} e^{-30}$$



behem 5 min

$$P[X=x] = \frac{\left(\frac{5}{2}\right)^x}{x!} e^{-5/2}$$

$$P[X=0] = \frac{\left(\frac{5}{2}\right)^0}{0!} e^{-5/2} = e^{-5/2} \approx 0,082$$