$X \quad M_X(t) = E(e^{tX})$

$X \sim f(x)$

$$M(t) = E(e^{tX}) = \int_{-\infty}^{\infty} e^{tx} f(x)\,dx$$

$f(x) = \frac{1}{a} \quad x \in (0, a)$

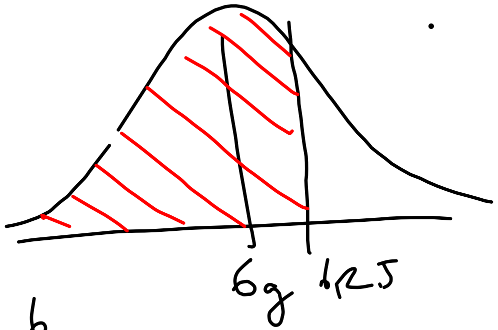
0 jinak

$$E(e^{tX}) = \int_{-\infty}^{\infty} e^{tX} \cdot f(x)\,dx = \int_0^a e^{tx} \frac{1}{a}\,dx =$$

$$= \frac{1}{a}\int_0^a e^{tx}\,dx = \left[\frac{1}{a} \cdot \frac{1}{t} e^{tx}\right]_0^a = \frac{1}{at} \cdot e^{at} - \frac{1}{at}$$

$$\left[\frac{1}{at}\left(e^{at} - 1\right)\right]' = \frac{-1}{at^2}\left(e^{at} - 1\right) +$$

$$+ \frac{1}{at}\left(a e^{at}\right)$$



16 porcí

100 g

$\frac{100}{16} = 6,25$

$\sum_{i=1}^{16} X_i \qquad X_i \sim N(6;\ 1,196)$

$$\frac{\sum X_i - n \cdot E(X)}{\sqrt{D(X) \cdot n}} \sim N(0;1)$$

$$P\left(\sum X_i < 100\right) = P\left(\sum X_i - 16 \cdot 6 < 100 - 16 \cdot 6\right) = P\left(\sum X_i - 96 < 4\right) =$$

$$= P\left(\underbrace{\frac{\sum X_i - 96}{\sqrt{1,196 \cdot 16}}}_{U} < \frac{4}{\sqrt{1,196} \cdot 4}\right) =$$

$$= P(U < 0,914) = \Phi(0,914) =$$

$= 0,82$

$X_i \sim N(6;\ D(X))$

$\sum_{i=1}^{16} X_i \sim N(16 \cdot 6;\ 16 \cdot D(X))$

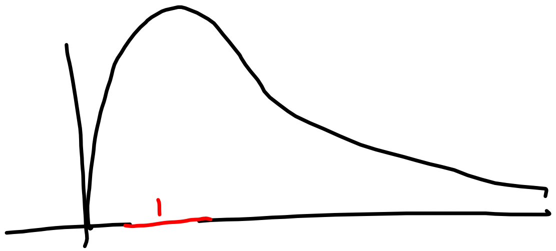
$N(10;\ 0{,}\underbrace{0737}_{\sigma^2})$

$n = 21$

$\sigma < 0{,}2$

$\sigma^2 < 0{,}04$

$$K = \frac{(n-1)S^2}{\sigma^2} \sim \chi^2(n-1)$$



$$P(S < 0{,}2) = P(S^2 < 0{,}04) =$$

$$P(20 \cdot S^2 < 20 \cdot 0{,}04) =$$

$$P\left(\underbrace{\frac{20 S^2}{0{,}0737}}_{K} < \frac{20 \cdot 0{,}04}{0{,}0737}\right) =$$

$$= P(K < 10{,}855) =$$

$$= \chi^2_{10{,}855}(20) = 0{,}05$$

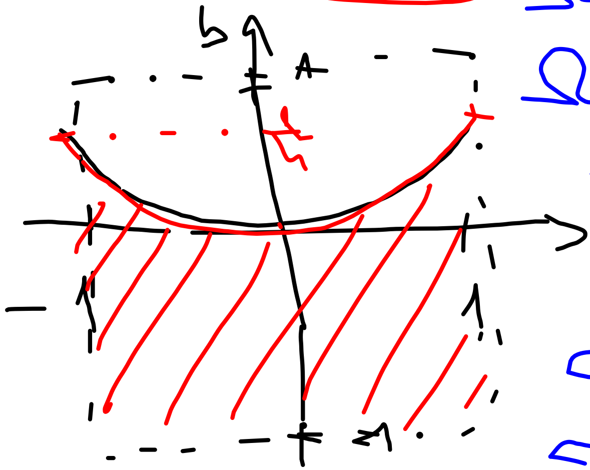
$$x^2 + ax + b$$

$$|a| \le 1 \qquad |b| \le 1$$

$$D \ge 0 = B^2 - 4AC \ge 0$$

$$a^2 - 4b \ge 0$$

$$\boxed{b \le \frac{a^2}{4}}$$



$$\Omega(\square) = 4$$

$$\Omega(\sqcup) = 2 + 2\int_0^1 \frac{a^2}{4}\,da = 2 + 2\left[\frac{a^3}{12}\right]_0^1 = \frac{13}{6}$$

$$P = \frac{\frac{13}{6}}{4} = \frac{13}{24}$$

1) $P(|X-E(X)| \geq t) \leq \frac{D(X)}{t^2}$

2) $\frac{Y - n\cdot\Theta}{\sqrt{n\Theta(1-\Theta)}} \sim N(0,1)$

$Bi(n; 0{,}1)$ $(0{,}08n ; 0{,}12n)$

1) $P(|\underbrace{X - n\cdot 0{,}1}| \geq 0{,}02n) \leq$

$0{,}95 = P(|X - n\cdot 0{,}1| < 0{,}02n) =$

$= 1 - P(|X - n\cdot 0{,}1| \geq 0{,}02n)$

$\geq 1 - \frac{n\cdot\Theta(1-\Theta)}{n^2\cdot 0{,}02^2}$

$0{,}95 \geq 1 - \frac{0{,}1\cdot 0{,}9}{n\cdot 0{,}02^2}$

$n = 4000$

2) $\frac{X - n\cdot\Theta}{\sqrt{n\cdot\Theta(1-\Theta)}} \sim N(0,1)$

$P(n\cdot 0{,}08 < X < n\cdot 0{,}12) =$

$= P(n\cdot 0{,}08 - n\cdot 0{,}1 < X - n\cdot 0{,}1 < n\cdot 0{,}12 - n\cdot 0{,}1)$

$= P\left(\frac{n\cdot 0{,}08 - n\cdot 0{,}1}{\sqrt{n\cdot 0{,}1\cdot 0{,}9}} < \frac{X - n\cdot 0{,}1}{\sqrt{\ }} < \frac{n\cdot 0{,}12 - n\cdot 0{,}1}{\sqrt{\ }}\right)$

$P\left(\frac{n\cdot 0{,}08 - n\cdot 0{,}1}{\sqrt{\ }} < u < \frac{n\cdot 0{,}12 - n\cdot 0{,}1}{\sqrt{\ }}\right)$

$$P\left(\frac{n\cdot 0{,}12 - n\cdot 0{,}1}{\sqrt{\;}} > x\right) - P(X > n\cdot 0{,}1)$$

$$\Phi\left(\frac{n\,0{,}12 - n\,0{,}1}{\sqrt{n\,0{,}1\cdot 0{,}9}}\right) = 0{,}975$$

$$\frac{n\cdot 0{,}12 - n\,0{,}1}{\sqrt{n\,0{,}1\cdot 0{,}9}} = 1{,}96$$

$$P(X > 10) = P(X - n \cdot 0{,}1 <$$

$$X \sim Bi(n, 0{,}1)$$

$$< 10 - n \cdot 0{,}1) =$$

$$= P\left(\frac{X - n \cdot 0{,}1}{\sqrt{n \cdot 0{,}1 \cdot 0{,}9}} < \frac{10 - n \cdot 0{,}1}{\sqrt{n \cdot 0{,}1 \cdot 0{,}9}}\right)$$

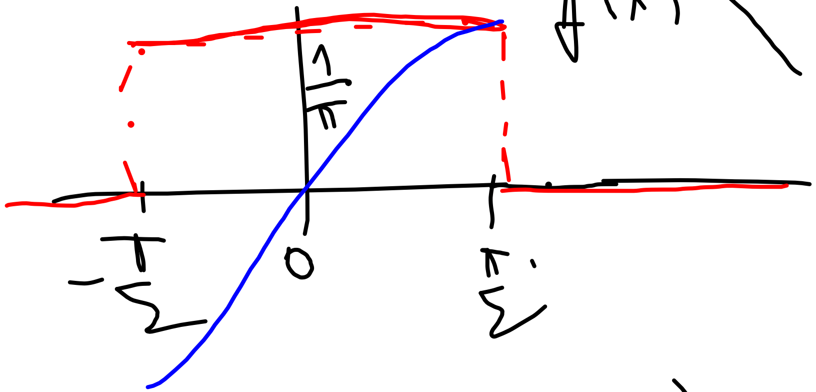
U

$$= P\left(U < \frac{10 - n\,0{,}1}{\sqrt{\quad}}\right) =$$

$$= \Phi\left(\frac{10 - n \cdot 0{,}1}{\sqrt{n \cdot 0{,}1 \cdot 0{,}9}}\right) = 0{,}9$$

$$\frac{10 - n \cdot 0{,}1}{\sqrt{n \cdot 0{,}1 \cdot 0{,}9}} = 1{,}3$$

$$X \sim Rs\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \qquad f(x) = \begin{cases} \frac{1}{\pi} \\ 0 \end{cases}$$



$$Y = \sin X = g(X)$$

$$X = \arcsin Y = \tau(Y)$$

$$f_*(y) = f(\tau(y)) \cdot \left| \frac{d\tau(y)}{dy} \right| =$$

$$f_*(y) = \begin{cases} \frac{1}{\pi} \cdot \frac{1}{\sqrt{1-y^2}} & y \in (-1, 1) \\ 0 & \text{jinak} \end{cases}$$

$\mathbb{Z}_6 \times \mathbb{Z}_5$

$\{(0,0)\}$

$\{(1,0),(2,0),(3,0),(4,0),(5,0),(0,0)\}$

$\{$

$$\mathbb{Z}_6 \times \mathbb{Z}_5 \cong \mathbb{Z}_{30}$$

$d \; \mathbb{Z}_{30} \quad d \mid 30$

$5 \cdot 2 \cdot 3$

$a_n x^n + \dots + a_1 x + a_0 \in \mathbb{Z}[x]$

$a_0, \dots, a_n \in \mathbb{Z}$

$f(x_0) = 0 \Rightarrow x_0 = \frac{p}{q}$

$p \mid a_0, \; q \mid a_n$

$p - q \mid f(1)$

$p + q \mid f(-1)$

$2x^4 + 5x^2 + 7x + 12$

$\frac{p}{q}$ $\quad p \mid 12 \quad \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

$q \mid 2 \quad \pm 1, \pm 2$

$f \quad x^3 + 3x^2 + 3x + 1$

$(x-a)^2 \mid f$

$(x-a) \mid f'$ $\quad$ i)

$$\boxed{(x-a) \mid \gcd(f, f')}$$

$f' = 3x^2 + 6x + 3$

$\boxed{f: x^3+3x^2+3x+1}$

$f' = 3x^2+6x+3$

f, f'

$$
\begin{array}{l}
(x^3+3x^2+3x+1) \\
-(x^3+2x^2+x) \\
\hline
x^2+2x+1
\end{array}
\quad x+1
$$

$\boxed{(x^2+2x+1)} =$

$\boxed{\text{zb } 0}$

$f: x^4-2x^3+3x^2-2x+2$

$\boxed{1+i}$

$\boxed{1-i}$

$(x-(1+i)) \mid f$

$(x-(1-i)) \mid f$

$(x-(1+i))(x-(1-i)) =$

$((x-1)-i)((x-1)+i) =$

$(x-1)^2 - i^2 = \boxed{x^2-2x+2}$

$(x^4-2x^3+3x^2-2x+2) : (x^2-2x+2) = \boxed{x^2+1}$

$$
\begin{array}{l}
-(x^4-2x^3+2x^2) \\
\hline
x^2-2x+2
\end{array}
$$

$f = (x^2-2x+2)(x^2+1)$

$\boxed{\mathbb{Z}_2[x]}$ pátého stupně

$\boxed{(x-a)(g)}$

$x^5+x^4+x^3+x^2+1$

$x^5+x^4+x^3+x+1$

$x^5+x^4+x^2+x+1$

$x^5+x^3+x^2+x+1$

$\cancel{x^5+x^4+1}$

x^5+x^3+1

x^5+x^2+1

$\cancel{x^5+x+1}$

$f = g \cdot h$

$g = x^2+x+1$

$h_1 = x^3+x^2+1$

$h_2 = x^3+x+1$

$(x^2+x+1)(x^3+x^2+1) = x^5+x+1$

$(x^2+x+1)(x^3+x+1) = x^5+x^4+\dots+1$

$(\mathbb{Z}_6, +, \cdot)$

$\underline{a+bi}$

$\underline{a-bi}$

$c+di$

$c-di$

$G/G \cong \underline{\{0\}}$

$S_3/S_3 \cong \{id\}$

$S_3/A_3 \cong \mathbb{Z}_2$

$(\mathbb{Z}_4, +)$ $\quad$ $(\mathbb{Z}_m, +)$

$\mathbb{Z}_4$ $\quad$ $\{0_4, 2_4\}$

$\{0_4\}$

$1 \longrightarrow 1$

$1+1 \longrightarrow 1+1$

$\varphi: (\mathbb{Z}, +, \cdot) \to (\mathbb{R}, +, \cdot)$

$1 \longrightarrow 1$

$\varphi(1+1) \to \varphi(1) + \varphi(1)$

$\varphi(2) \to 2$

$$\int x \cdot f(x) \qquad \int x \cdot \frac{x}{2}$$

$$f_Y(y) = \int_{-\infty}^{\operatorname{arctg} y} f_X(x)\, dx$$

$$f_Y(y) = \int_{-\infty}^{\operatorname{arctg} y} \frac{1}{\pi}\, dx$$