

$$F_x(t) = \int_{-\infty}^t \frac{1}{\pi} \frac{1}{1+x^2} dx = \frac{1}{\pi} \left(\arctg(t) + \frac{\pi}{2} \right) =$$

$$= \frac{\arctg(t)}{\pi} + \frac{1}{2}$$

1° $t \geq 0$

$$F_{\frac{1}{x}}(t) = P\left[\frac{1}{x} \leq t\right] = P\left[X \geq 0 \text{ e } \frac{1}{x} \leq t\right] +$$

$$+ P\left[X < 0 \text{ e } \frac{1}{x} \leq t\right] =$$

$$= P\left[X \geq \frac{1}{t}\right] + P\left[X < 0\right] = 1 - P\left[X < \frac{1}{t}\right]$$

$$+ P\left[X < 0\right] = 1 - F_x\left(\frac{1}{t}\right) - F_x(0) =$$

$$= 1 - \frac{\arctg \frac{1}{t}}{\pi} - \frac{1}{2} - \frac{1}{2} = -\frac{\arctg \frac{1}{t}}{\pi}$$

2° $t < 0$

$$F_{\frac{1}{x}}(t) = P\left[\frac{1}{x} \leq t\right] = P\left[\frac{1}{x} \leq t \text{ e } X \geq 0\right] +$$

$$+ P\left[\frac{1}{x} \leq t \text{ e } X < 0\right] =$$

$$= P[\emptyset] + P\left[0 > X \geq \frac{1}{t}\right] =$$

$$= F_x(0) - F_x(t) = \frac{\arctg 0}{\pi} + \frac{1}{2} -$$

$$\frac{\arctg \frac{1}{t}}{\pi} - \frac{1}{2} = \frac{\arctg \frac{1}{t}}{\pi}$$

$$F_{\frac{1}{x}}(t) = \begin{cases} -\frac{\operatorname{arctg}\left(\frac{1}{t}\right)}{\pi} & \text{dla } t \geq 0 \\ \frac{\operatorname{arctg}\left(\frac{1}{t}\right)}{\pi} & \text{dla } t < 0 \end{cases}$$

$$F_{\frac{1}{x}}'(t) = \begin{cases} -\frac{1}{\pi} \cdot \frac{1}{1+\frac{1}{t^2}} \cdot \left(-\frac{1}{t^2}\right) & \text{dla } t \geq 0 \\ \frac{1}{\pi} \cdot \frac{1}{1+\frac{1}{t^2}} \cdot \left(-\frac{1}{t^2}\right) & \text{dla } t < 0 \end{cases}$$

$$F_{\frac{1}{x}}'(t) = \frac{1}{\pi} \cdot \frac{1}{1+t^2} \quad \left(\begin{array}{l} \text{Dla } 0 \text{ w sumie} \\ \text{nie wiadomo, ale} \\ \mu(\{0\}) = 0 \end{array} \right)$$

\parallel
 $f_{\frac{1}{x}}'(t)$

Skoro gęstości te same, to rozkłady też.