$$\int_0^\infty 2x e^{-x^2}\,dx = \int_0^{-\infty} -e^{y}\cdot dy = \left[-e^{y}\right]_0^{-\infty} = \lim_{y\to -\infty^+} -e^{y} - \lim_{y\to 0^-} -e^{-y}$$

$y = -x^2$

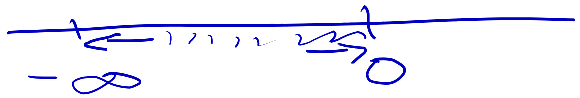
$dy = -2x$

| $x$ | $0$ | $\infty$ |
|---|---|---|
| $y=-x^2$ | $0$ | $-\infty$ |

$$= -0 - -1 = \underline{\underline{1}}$$

$$\int_a^b f = -\int_b^a f$$

$$-\int_{-\infty}^{0} -e^{y}\,dy$$



$$\int_0^{4\pi} \frac{1}{\sin^2 x + 2\cos^2 x}\,dx$$

- $f(x) = \dfrac{1}{1+\cos^2 x}$ $\quad x \in \mathbb{R}$, f spoj. na $\mathbb{R}$ → má PF na $\mathbb{R}$ :-)

f spoj. $[0, 4\pi]$ → má (N) $\int_0^{4\pi}$

$w(x) = \tan x \quad x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) + k\pi$

$\tan\left(\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)\right) = (-\infty, \infty)$

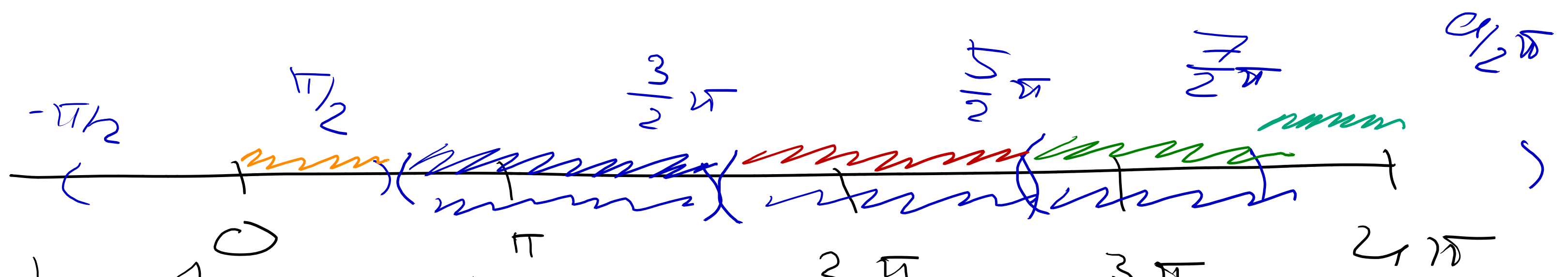
- $t = \tan x$

$$\int \frac{1}{\frac{t^2}{1+t^2} + 2\frac{1}{1+t^2}} \cdot \frac{1}{1+t^2}\,dt = \int \frac{1}{t^2+2}\,dt$$

$$= \frac{1}{2}\sqrt{2}\,\arctan\frac{t}{\sqrt{2}}$$

~~$\left[\frac{\sqrt{2}}{2}\arctan\frac{\tan x}{\sqrt{2}}\right]_0^{4\pi}$~~

~~| x | 0 | $4\pi$ |~~
~~| $t = \tan x$ | 0 | 0 |~~



$w' = \frac{1}{\cos^2 x}$ $\quad w' \neq 0 \quad \forall x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) + k\pi$

$w_1 = \tan x \quad x \in \left(\frac{\pi}{2}, \frac{3}{2}\pi\right) \quad (-\infty, \infty)$

$\alpha \quad \beta \qquad a \quad b$

$$\int_{-\infty}^{\infty} \frac{1}{t^2+2}\,dt = \left[\frac{\sqrt{2}}{2}\arctan\frac{t}{\sqrt{2}}\right]_{-\infty}^{\infty} = \frac{\sqrt{2}}{2}\frac{\pi}{2} - \frac{\sqrt{2}}{2}\left(-\frac{\pi}{2}\right) = \frac{\sqrt{2}}{2}\pi$$

$w_2 = \tan x \quad x \in \left(\frac{3}{2}\pi, \frac{5}{2}\pi\right) \quad (-\infty, \infty)$

$$\int_{-\infty}^{\infty} \frac{1}{t^2+2}\,dt = \ldots = \frac{\sqrt{2}}{2}\pi$$

$w_3 = \tan x \quad x \in \left(\frac{5}{2}\pi, \frac{7}{2}\pi\right)$

$$\ldots = \frac{\sqrt{2}}{2}\pi$$

$w_4 = \tan x \quad x \in \left(0, \frac{\pi}{2}\right) \quad (0, \infty)$

$$\int_0^{\infty} \frac{1}{t^2+2}\,dt = \left[\frac{2}{\sqrt{2}}\arctan\frac{t}{\sqrt{2}}\right]_0^{\infty} = \frac{2}{\sqrt{2}}\frac{\pi}{2} - 0$$

$w_5 = \tan x \quad x \in \left(\frac{7}{2}\pi, 4\pi\right) \quad (-\infty, 0)$

$$\int_{-\infty}^{0} \frac{1}{t^2+2}\,dt = \left[\quad\right]_{-\infty}^{0} = 0 - \frac{2}{\sqrt{2}}\left(-\frac{\pi}{2}\right)$$

Celkem $\quad 3 \cdot \frac{\sqrt{2}}{2}\pi + 2 \cdot \frac{2}{\sqrt{2}}\frac{\pi}{2} = 2\sqrt{2}\,\pi$