

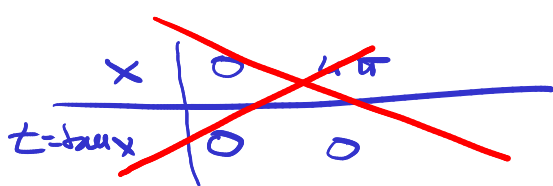
$$\int_0^{4\pi} \frac{1}{\sin^2 x + 2\cos^2 x} dx$$

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

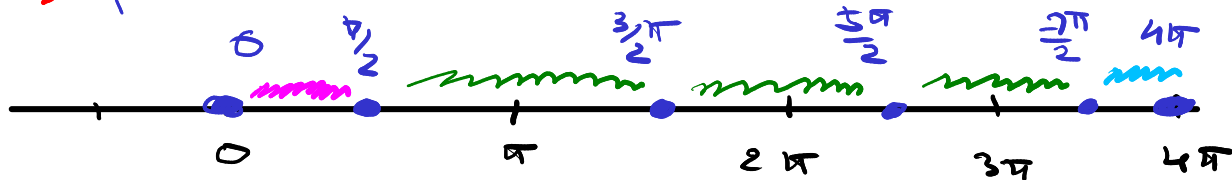
$$dz = \frac{1}{\cos^2 x} dx \quad w'(x) = \frac{1}{\cos^2 x} \neq 0 \quad (\text{var } (\alpha, \beta))$$

$$\int \frac{1}{\frac{z^2}{1+z^2} + 2 \frac{1}{1+z^2}} dz = \int \frac{1}{z^2+2} dz = \int \frac{1}{2\left(\left(\frac{z}{\sqrt{2}}\right)^2+1\right)} dz$$

$$= \frac{1}{2} \sqrt{2} \operatorname{arctan} \frac{z}{\sqrt{2}} + C$$



~~$$\int_0^{\infty} \frac{z}{z^2+2} dz = 0$$~~



$$\int_0^{4\pi} \frac{1}{\sin^2 x + 2\cos^2 x} = \int_0^{\pi/2} + \int_{\pi/2}^{3\pi/2} + \int_{3\pi/2}^{5\pi/2} + \int_{5\pi/2}^{7\pi/2} + \int_{7\pi/2}^{4\pi}$$

$$(0, \pi/2) = (0, \infty)$$

$$(\pi/2, 3\pi/2) = (-\infty, \infty)$$

$$(\pi, 3\pi/2) = (-\infty, 0)$$

$$\tan(0, \pi/2) = (0, \infty) = (a, b)$$

$$\tan(\pi/2, 3\pi/2) = (-\infty, \infty) = (a, b)$$

$$\tan(\pi, 3\pi/2) = (-\infty, 0) = (a, b)$$

$$\rightarrow \int_0^{\infty} \frac{1}{2+z^2} dz = \left[ \frac{\sqrt{2}}{2} \operatorname{arctan} \frac{z}{\sqrt{2}} \right]_0^{\infty} = \frac{\sqrt{2}}{2} \frac{\pi}{2}$$

$$\rightarrow \int_{-\infty}^{\infty} \frac{1}{2+z^2} dz = \left[ \frac{\sqrt{2}}{2} \operatorname{arctan} \frac{z}{\sqrt{2}} \right]_{-\infty}^{\infty} = \frac{\sqrt{2}}{2} \left( \frac{\pi}{2} - \left(-\frac{\pi}{2}\right) \right)$$

$$\rightarrow \int_{-\infty}^0 \frac{1}{2+z^2} dz = \left[ \frac{\sqrt{2}}{2} \operatorname{arctan} \frac{z}{\sqrt{2}} \right]_{-\infty}^0 = -\frac{\sqrt{2}}{2} \left(-\frac{\pi}{2}\right)$$

cel reu :

4 m

∫<sub>0</sub>

$$= \frac{\sqrt{2}}{2} \left( \frac{\pi}{2} + 3\pi + \frac{\pi}{2} \right) = \underline{\underline{2\sqrt{2}\pi}}$$