

Misc Tricks

We wish to find

$$\int_{-\infty}^{\infty} \frac{\sin(x)}{x} dx \quad (1)$$

this is $2f(0)$ where

$$f(s) = \int_0^{+\infty} \frac{\sin(x)}{x} e^{-sx} dx \quad (2)$$

$$(3)$$

differentiating,

$$f'(s) = - \int_0^{\infty} \sin(x) e^{-sx} dx \quad (4)$$

$$= - \frac{1}{1+s^2} \quad (5)$$

solving with $f(\infty) = 0$,

$$f(s) = \frac{\pi}{2} - \tan^{-1}(s) \quad (6)$$

$$\int_{-\infty}^{\infty} \frac{\sin(x)}{x} dx = \pi \quad (7)$$