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$$y(t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{tx} e^{-x^2/2} dx = e^{t^2/2}$$

$$1 = \frac{1}{\sqrt{2\pi}\sigma} \int_{-\infty}^{\infty} e^{-(x-\mu)^2/2\sigma^2} dx = 1$$

$$1 = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-t^2/2 + tx - x^2/2} dx$$