Monday, October 5, 2020 2:57 PM

$g(x) = e^{-ax^2}$

$\mathcal{F}(f(x)) = \int_{-\infty}^{+\infty} e^{-ax^2} e^{-2\pi i k x}\, dx = \mathcal{F}(g(x))(k)$

$= \int_{-\infty}^{+\infty} e^{-ax^2} \left(\underbrace{\cos(2\pi i k x)}_{f(x)=f(-x)} - i \underbrace{\sin(2\pi i k x)}_{f(-x)=-f(x)\ \Rightarrow\ 0}\right) = \int_{-\infty}^{+\infty} e^{-ax^2} \cos(2\pi k x)\, dx$

$G(k) = \sqrt{\frac{\pi}{a}}\, e^{-\frac{\pi^2 k^2}{a}}$

$g(x) = e^{-ax^2}$

$\mathcal{F}(\ ) = \sqrt{\frac{\pi}{a}}\, e^{-\frac{\pi^2 k^2}{a}} \Rightarrow \frac{1}{\sqrt{2\pi}\sigma} \sqrt{2\pi\sigma^2}\, e^{-\pi^2 k^2 2\sigma^2} = e^{-2\pi^2\sigma^2 k^2}$ (negative)

$g(x) = \frac{1}{\sigma\sqrt{2\pi}}\, e^{-\frac{x^2}{2\sigma^2}} \Rightarrow$

$a = \frac{1}{2\sigma^2} \Rightarrow \frac{1}{a} = 2\sigma^2$

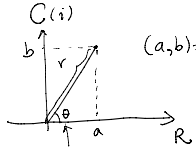
$\sigma > 0$

$\alpha < 0 \leftarrow 0$

$e^{\alpha} \quad e^{\alpha} = 1$

$0 \leq \quad < 1$

C(i)



$(a,b) = a + bi \Rightarrow r = \sqrt{a^2+b^2}$

$a = r\cos\theta$, $b = r\sin\theta$ $\Rightarrow$

$(a,b) = r\cos\theta + r\sin\theta\, i = r(\cos\theta + \sin\theta\, i)$

$= re^{\theta i}$

$g(x) * I(x) \Leftrightarrow G(k) \cdot \mathcal{F}(I(x))$

tive number

$\alpha > 0$

$\longrightarrow \alpha$

$e \to +\infty$