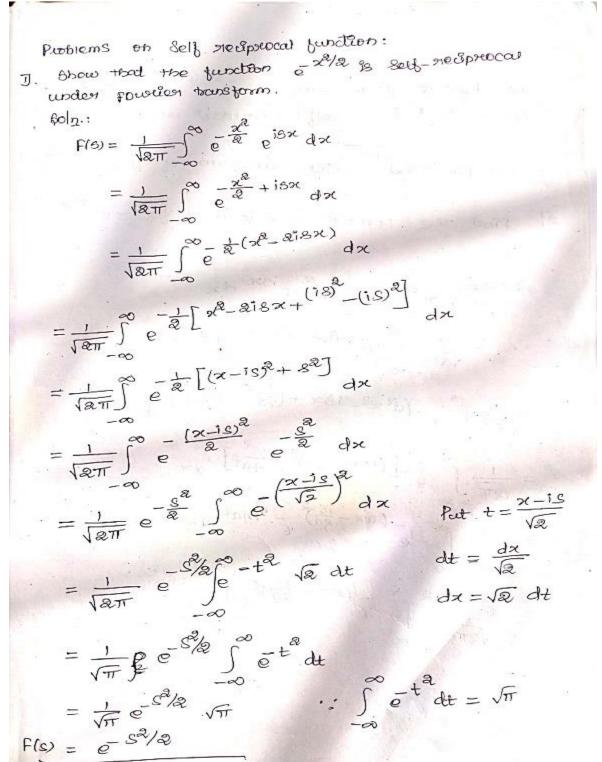


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UNIT-IV FOURIER SERIES AND FOURIER TRANSFORM FOURIER TRANSFORM-SELF RECIPROCAL FUNCTION





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Hence The Fowcier transform of $e^{-\frac{x^2}{2}}$ is $e^{-\frac{x^2}{2}}$. Hence $e^{-\frac{x^2}{2}}$ is self reapporar under f.T.

How Find the purior transform of $f(x) = e^{-\frac{x^2}{2}}$. find the fowder transform of fox) = e Soln .: F(S) = 1 Pe al xe e isx dx = 1 50 = 102 x2+1500 dx $=\frac{1}{\sqrt{2\pi}}\int_{0}^{\infty}e^{-\left(\alpha^{2}x^{2}-iSx+\left(\frac{iS}{2\alpha}\right)^{2}-\left(\frac{iS}{2\alpha}\right)^{2}\right)}dx$ $=\frac{1}{\sqrt{a\pi}}\int_{-\infty}^{\infty}e^{-\left[\left(\alpha\varkappa-\frac{is}{a^{2}}a^{2}\right)^{2}+\frac{g^{2}}{4a^{2}}\right]}d\varkappa$ $=\frac{1}{\sqrt{2\pi}}\int_{0}^{\infty}\frac{-(\alpha x-\frac{15}{2a})^{\frac{3}{2}}}{e}e^{-\frac{3^{\frac{3}{2}}}{4}a^{\frac{3}{2}}}dx$ $= \frac{e^{8^2/4a^2}}{e^{-8^2/4a^2}} \int_{e^{-8^2/4a^2}} e^{-(\alpha x - \frac{is}{2a})^2}$



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Put
$$t = ax - \frac{ig}{2a}$$
 $x = -\infty \Rightarrow t = -\infty$

$$dt = a dx$$

$$dx = \frac{dt}{a}$$

$$= \frac{e}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{\pm \frac{a}{2}} dt$$

$$= \frac{e^{3}/4a^{2}}{a\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{\pm \frac{a}{2}} dt$$

$$= \frac{e^{3}/4a^{2}}{a\sqrt{2}} \int_{-\infty}^{\infty} e^{\pm \frac{a}{2}} dt$$