$$\phi_X(t) = E(e^{tx}) = \int_{-\infty}^{\infty} e^{tx} f_X(x)\,dx$$

$$f_X(x) = x^{n/2-1} e^{-x/2} \times \frac{1}{2^{n/2}\,\Gamma(n/2)}$$

$$= c \int_0^{\infty} e^{tx}\, x^{n/2-1}\, e^{-x/2}\,dx$$

$$= c \int_0^{\infty} x^{n/2-1}\, e^{-\left(\frac{1}{2}-t\right)x}\,dx \qquad y = \left(\frac{1}{2}-t\right)x$$

$$dy = \left(\frac{1}{2}-t\right)dx$$

$$= c \int_0^{\infty} \left(\frac{2y}{1-2t}\right)^{\frac{n}{2}-1} e^{-y}\,dy\,\frac{2}{1-2t}$$

$$= c \int_0^{\infty} \frac{2^{n/2}}{(1-2t)^{n/2}}\, y^{n/2-1}\, e^{-y}\,dy$$

$$= c \left(\frac{2}{1-2t}\right)^{n/2} \int_0^{\infty} y^{n/2-1} e^{-y}\,dy \qquad \Gamma(n/2)$$

$$= \frac{1}{2^{n/2}\Gamma(n/2)} \frac{2^{n/2}}{(1-2t)^{n/2}} \qquad \Gamma(n/2) = (1-2t)^{-n/2}$$

$A = \{1, 2, 3, 4, 5\}$

$n = 5$ elements $\quad k = 2$ elements.