$$\int_0^\infty x\lambda e^{-\lambda x}\,dx \longrightarrow$$

सूत्र:

$u = x$

$v = \lambda e^{-\lambda x}$

$$\int uv\,dx = u\int v\,dx - \int\left[\frac{du}{dx}\left(\int v\,dx\right)\right]dx$$

सूत्र:

$$\boxed{\int uv\,dx = u\int v\,dx - \int\left[\frac{du}{dx}\int v\,dx\right]dx}$$

$$x\lambda e^{-\lambda x}$$

$$x\int_0^\infty \lambda e^{-\lambda x}\,dx - \int_0^\infty\left[\frac{d}{dx}(x)\cdot\int_0^\infty \lambda e^{-\lambda x}\,dx\right]dx$$

$$= x\left[-e^{-\lambda x}\right]_0^\infty - \int_0^\infty -e^{-\lambda x}\,dx$$

$$= x\left[e^{-\lambda x}\right]_\infty^\infty$$

$$= 0 + \int_0^\infty e^{-\lambda x}\,dx$$

$$= \left[\frac{e^{-\lambda x}}{-\lambda}\right]_0^\infty = -\frac{1}{\lambda}\left[\frac{1}{e^{\lambda x}}\right]_0^\infty = -\frac{1}{\lambda}\left[0 - \frac{1}{e^0}\right]$$

$$= -\frac{1}{\lambda}(-1) = \boxed{\frac{1}{\lambda}}$$