$$\int\limits_{0}^{\ln 2} xe^{-x}\,dx = xe^{-x} - e^{-x} + C = -(x+1)e^{-x} + C$$

$u = -x \; ; \; du = -dx \; ; \; \int ue^{u}\,du$

$\int u\,dv = uv - \int v\,du$

$u(u) = U$ и $dv(u) = e^{u} \; ; \; du(u) = 1$

$\int e^{u}\,du = e^{u}$

$-xe^{-x} - e^{-x} \; \Longrightarrow \; -(x+1)e^{-x} + C$