

$$F_Z(z) =$$

$$z \in \mathbb{R}^+$$

$$Pr(Z \leq z) = 1 - Pr\{Z > z\}$$

$$= 1 - Pr\{X > z \text{ and } Y > z\}$$

$$= 1 - Pr\{X > z\} \times Pr\{Y > z\}$$

$$= 1 - (1 - Pr\{X < z\}) (1 - Pr\{Y < z\})$$

$$= 1 - (1 - (1 - e^{-\lambda z})) (1 - (1 - e^{-\lambda_2 z}))$$

$$= 1 - e^{-z(\lambda_1 + \lambda_2)}$$

$$F_X(x) = \int_0^x \lambda e^{-u\lambda} du = -e^{-u\lambda} \Big|_0^x$$

$$= 1 - e^{-x\lambda} \quad x > 0.$$