[nex79] **Product of independent random variables**

Consider two independent random variables X_1, X_2, one exponentially distributed, $P_1(x_1) = e^{-x_1}$, $0 < x_1 < \infty$, and the other uniformly distributed, $P_2(x_2) = 1$, $0 < x_2 < 1$.

(a) Determine the probability distribution $P_Z(z)$ of the random variable $Z = X_1 X_2$ for $0 < z < \infty$.

(b) Analyze the properties of $P_Z(z)$ for $z \to 0$ and for $z \to \infty$.