Waste

$$y = x \cdot p(x<L) + (x-L) \cdot p(x>L)$$

$$y = x\, p(x<L) + (x-L) \cdot (1 - p(x<L))$$

$$y = \cancel{x p(x<L)} + x - L - \cancel{x p(x<L)} + L \cdot p(x<L)$$

$$y = x - L + L \cdot p(x<L)$$

$$\mathbb{E}(y) = \mathbb{E}(x - L + L \cdot p(x<L))$$

$$\mathbb{E}(y) = \mathbb{E}(x) - L + L\, p(x<L)$$

$\mathbb{E}(\text{constant}) = \text{constant}$

$$\boxed{\mu_y = \mu_x - L + L p(x<L)} \leftarrow \mathrm{I}$$

$$p(x<L) = \int_{-\infty}^{L} f_x(x) = F_x(x) = CDF(x)$$

if X is normally distributed then:

$$CDF(x) = \frac{1}{2}\left(1 + \operatorname{erf}\left(\frac{x - \mu_x}{\sigma \sqrt{2}}\right)\right)$$

$$\frac{d}{dx}\mu_y = \frac{d}{dx}\left(\mu_x - L + L \cdot CDF(x)\right) \overset{!}{=} 0$$

find ~~maximum~~ minimum

for ~~max~~ $L = 2\,[m]$, $\sigma = 0.02\,[m]$: the minimum is at $\underline{\underline{\mu_x = 2.054\,[m]}}$