1. (J & C 5.1) A beam of photons has a linear attenuation coefficient of 0.03 cm\(^{-1}\). Calculate the fraction of the photons transmitted through layers of material 5 mm, 1.5 cm, and 20 cm thick, first using the equation \(\Delta N = -\mu N \Delta x\), then using the equation \(N = N_0 e^{-\mu x}\). Account for the differences in your answer.

2. (J & C 5.2) For the beam in problem 1 calculate the HVL and TVL.
   a. Plot using the HVL only and extrapolate or interpolate to 20 cm thickness.
   b. Plot using the TVL and interpolate to obtain the HVL (graphically)
   c. Compare with calculated values.

3. Derive the equation TVL = 3.32 HVL.