(6.15) A swimming-pool reactor produces a flux of 3*10^{16} thermal neutrons m^{-2}s^{-1} at 1 m from the reactor center. Assuming a parallel beam of neutrons diffusing up to the surface of the pool where the neutron flux is measured to be 10^{8} n m^{-2}s^{-1}, calculate the thickness (x m) of the water layer required. For thermal neutrons the flux is reduced exponentially with the exponent $x*L^{-1}$, where L is the diffusion length (2.75 cm in H_2O).

$$fluxdamping := \frac{10^{8}}{3\cdot 10^{16}} \qquad fluxdamping = 3.333\cdot 10^{-9}$$

$$L := 2.75\cdot cm$$

$$\phi = \phi_0 \cdot exp\left(\frac{-x}{L}\right) \qquad fluxdamping = exp\left(\frac{-x}{L}\right)$$

$$x := -ln(fluxdamping)\cdot L \qquad x = 0.537\cdot m$$