Special Instructions: Closed Book. All calculators and up to 6 single sided 8 ½" by 11" crib
                    sheets are permitted.
THIS EXAMINATION PAPER INCLUDES 1 PAGE AND 1 QUESTION.

1.   Consider an infinite planar source of neutrons in an infinite absorbing medium. The
        source strength is S neutrons/cm^2/sec. Given the resulting flux distribution as derived in
        class, determine the absorption rate at any point in space and show that the total
        absorption rate of neutrons equals the production rate of neutrons.

The interaction rate at a point is $\Sigma_a \phi$ for absorption. The flux dist^n for this case is $\phi = \dfrac{SL}{2D} e^{-|x|/L}$.

Total abs. rate $= \displaystyle\int_0^{\infty} \Sigma_a \phi = \int_0^{\infty} \Sigma_a \dfrac{SL}{2D} e^{-x/L}$ for right half.

$\therefore$ abs. rate $= \Sigma_a \dfrac{SL}{2D} (-L) \, e^{-x/L} \Big|_0^{\infty} = -\dfrac{SL^2}{2D}(0-1)\Sigma_a$

$= \dfrac{S}{2}$ since $L^2 = \dfrac{D}{\Sigma_a}$.

$=$ production rate for right hand side.