Section 4.11-4.12

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Molecules are placed in a liquid at a time $t = 0$ and diffuse according to a diffusion constant D, i.e., the density of molecules satisfy the diffusion equation,

$$\frac{\partial \rho}{\partial t} = D \frac{\partial^2 \rho}{\partial x^2}$$

(a) Suppose at $t = 0$ we have:

$$\rho(x, 0) = \delta(x)$$

Find the value of A(t) using a trial solution of the form:

$$\rho(x, t) = \sqrt{\frac{A(t)}{\pi}} \exp(-A(t)x^2)$$

(b) Add a reflective boundary at $x = 0$, and place a drop at a distance a from the boundary. Solve for the density $\rho(x, t)$.