

Problem H

For the Born approximation for scattering from a weak soft-sphere potential

$$V(\mathbf{r}) = \begin{cases} V_0 & r < a \\ 0 & r > a, \end{cases}$$

(see Problem 11.10), plot $D(\theta)$ versus θ for the following range of energies: $ka = 0.1, 0.3, 1, 3, 10$. Put the plots on the same graph, and for convenience, set $mV_0a^3/\hbar^2 = 1$ (this corresponds to a choice of length scale).

Problem I

Show that the Born series summed to all orders converges to the exact solution to the integral Schrödinger Equation. *Hint:* use notation as in Eq. 11.101, and use the sum of a geometric series as a guide.