Problem G

Consider scattering a plane wave off a finite constant spherical potential well

\[ V(r) = \begin{cases} 
-V_0 & r < a \\
0 & r > a. 
\end{cases} \]

(a) In Problem F, we calculated the S-wave contribution to \( \sigma \) for this potential. Simplify the result for \( \sigma \) from problem F in the weak-potential (small \( V_0 \)) limit.

(b) Now calculate the low-energy Born approximation cross section \( \sigma \) for this potential.

(c) Your answers from (a) and (b) should match. Explain why.