Exercise 1: Transmission through a potential barrier (3 Points)

- Consider a potential $V(x) = 0$ for $x < 0$, and $V(x) = V_0 - Fx$ for $x > 0$, where V_0 and F are positive constants. Consider a particle moving from left to right with energy $0 < E < V_0$. Calculate the tunnel probability $|T|^2$ of the particle through the barrier.
- Consider the same problem, but now with a potential of the form $V(x) = 0$ for $x < 0$, and $V(x) = V_0 - \alpha x^2$ for $x > 0$; $\alpha > 0$.

Exercise 2: Transmission through a delta (3 Points)

Consider a potential $V(x) = g\delta(x)$, where $g > 0$ is a constant. Calculate the transmission probability $|T|^2$ for a particle through the barrier.

Exercise 3: Double-delta potential (4 Points)

Consider a potential of the form $V(x) = g(\delta(x) + \delta(x - a))$, where $g > 0$ and $a > 0$ are constants. Obtain the transmission coefficient for a particle through this potential. Depict your result.You must see that there are particular energies for which the transmission $|T|^2$ is anomalously large (resonant tunneling). Which are these energies?