1. Solve Cohen-Tannoudji problem #3.5 (particle subject to a constant force).

2. Reflection from step potential. Note: This problem is entirely numerical and must be done on a computer. Because it combines numerical calculation with graphing, you may wish to use a package such as maple, mathematica or matlab to carry it out.

Consider the transmission of an electron through a junction between two materials. You may model the junction using the potential

\[ V(x) = \begin{cases} 
0 & (x < 0) \\
1 & (x > 0) 
\end{cases} \]

where the units are eV (electron volts).

Use the exact analytic solution to describe a single incoming electron using a wavepacket centered at a wavevector equivalent to \( E = 1.1 \text{ eV} \) and traveling to the right. Plot figures such as Fig. 1 (bcd) on page 84 of Cohen-Tannoudji illustrating the reflection and transmission process before, during and after impact. Be sure all the axes on your graphs are clearly labeled using the length unit of 1 nm=10^{-9} \text{ m}. State the value of the time for each figure. Calculate the exact transmission and reflection coefficients and compare with your final figure.