If you are using a jupyter notebook (recommended), then keep all your programs in a single notebook. A good programming style is to define a function for one task with clearly defined input (arguments) and output. For plots you may use matplotlib (if you are using python) or gnuplot (if you are using c or fortran) or LsqFit module if you are using Julia.

---

If you are planning to submit separate programs, then please follow the guideline below:

- Keep all files of a worksheet in a single folder.
- Follow a systematic naming convention. You may name the program files as `Q1.py` or `Q1a.py`, `Q1b.py` for question 1 (if you have created multiple files for a single question). The data file should be named as `Q1-data-a.dat` and so on.
- Finally compress the entire folder as a single `.zip` or `.tgz` (using `tar cvfz archive.tgz folder-name/`, and submit the file in WeLearn.

---

1. (20 points) Consider a Gaussian wavepacket $\frac{1}{\sigma\sqrt{2\pi}}\exp(-(x-x_\circ)^2/2\sigma^2)$. It is given that $\sigma = 0.2$ and $x_\circ = 3$. Solve the time dependent Schrödinger equation for $-10 \leq x \leq 10$ for the following potentials.

   (a) (10 points)

   $$V(x) = \begin{cases} 0, & \text{for } x < 5.0 \text{ and } x > 7 \\ V_\circ, & \text{for} 5 \leq x \leq 7 \end{cases}$$

   where, $V_\circ = 40$

   (b) (10 points)

   $$V(x) = 0.1 * x^2.$$