If you have trouble with this assignment, try to think it through. And if you're stuck for awhile, then check the solution.

Question 1: Create a python function that computes $f(x) = e^{-4\sin(2\pi x)}$ and then plot the function from $x = 0$ to $x = 1$. (*Hint: Create a numpy array of 1000 evenly spaced x values, then evaluate the function and store it in a new array, then plot.*)

Question 2: One way of computing the integral of a function numerically is using the approximation $\sum_i f(x_i)\Delta x$ where the sum is only for x_i between the bounds of integration.

- **Part 1**: Use the `np.sum` function and the spacing between the values in the x array (i.e. Δx) from question 1 to evaluate $\int_0^1 e^{-4\sin(2\pi x)}dx$
- **Part 2**: The numpy function `np.cumsum(arr)` computes the cumulative sum of elements in an array `arr`. For example, if `arr=[0,4,7,2]` then `np.cumsum(arr)= [0,4,11,13]`. Use this function to compute and plot $F(x) = \int_0^x e^{-4\sin(2\pi x')}dx'$

Question 3: One way to compute the derivative of a function numerically is using the approximation $f' = \Delta f_i/\Delta x$.

- **Part 1**: The `np.diff` function is used to compute the differences between consecutive elements of an array. For example, if `arr=[0,4,7,2]` then `np.diff(arr)= [-4,3,-5]` (*Note: The length becomes 1 smaller*). Use this to compute Δf from the data in Question 1
- **Part 2**: Compute $f' = \Delta f/\Delta x$ and plot as a function of x (*Hint: You'll need to make sure the x and y arrays you're plotting are the same size. Check their lengths before plotting*)

Question 4: Open the file `scintillator.csv`.

- **Part 1**: Create a plot with data in the `channel` column on the x axis and the `cs137` on the y axis, like was done in the previous lecture.
- **Part 2**: Using boolean indexing, plot only these again, but only for values where the `cs137` data exceeds 1500. Add a grid, x and y labels, and a title to the plot.