Lecture 17 – Programming with Excel

* Prayer / spiritual thought
* announcement
* Unit of the day:

$$1\,gal = 3.785\,L$$

(a liter is a little more than a quart)

I. Macros and VBA.

* Sometimes you want to automate a task.
  In Excel you can do this by recording a Macro

* Enable Macros:
  - File → Options → Customize Ribbon → ☑ Developer
  - Save sheet as a .xlsm (macro-enabled workbook)

Example
- Record a macro to format a table.
- Show how to record & run the macro.

See file: Toluene_Heat_Capacity.xlsm

* Macros are actually computer-written code in a language called "Visual Basic for Applications" or VBA for short.

  (Visual Basic is a programming language written and maintained by microsoft. VBA is a form of visual basic used for writing macros inside office applications.)

* VBA code can be accessed from the developer ribbon
  ↳ "Visual Basic" button
* VBA code can also be accessed by "editing" a macro.
* VBA is a programming language, like Python, and it can be used to write subroutines / macros and Excel functions. This makes Excel much more powerful!

* Elements of VBA language
  - See handout:
    - comments
    - variables
    - conditionals
    - arrays
    - loops
    - subroutines
    - functions

Briefly cover the handout.
→ Expect students will be familiar with where to go to learn more about VBA.

Example

- Use trapezoidal rule to do a quadrature of the $C_p(T)$ data to find an enthalpy
- write a "trapz" function to do this.

see file:
Toluene - Heat - Capacity . xlsm

II. Excel and Python

* Sometimes you have something that is hard to do in Excel or Python alone.
* The "xlwings" module allows one to interface the two.

* xlwings basics
  - see handout :
    - import xlwings
    - get/push data from/to Excel from Python
    - manipulating arrays
    - plots

* running python from VBA.

Example :

- Fit a cubic spline to the heat capacity data
- Make a plot & import it to Excel.
- Write a subroutine to use a spline from python to interpolate a data point.

See file : Toluene-Heat-Capacity.xlsm