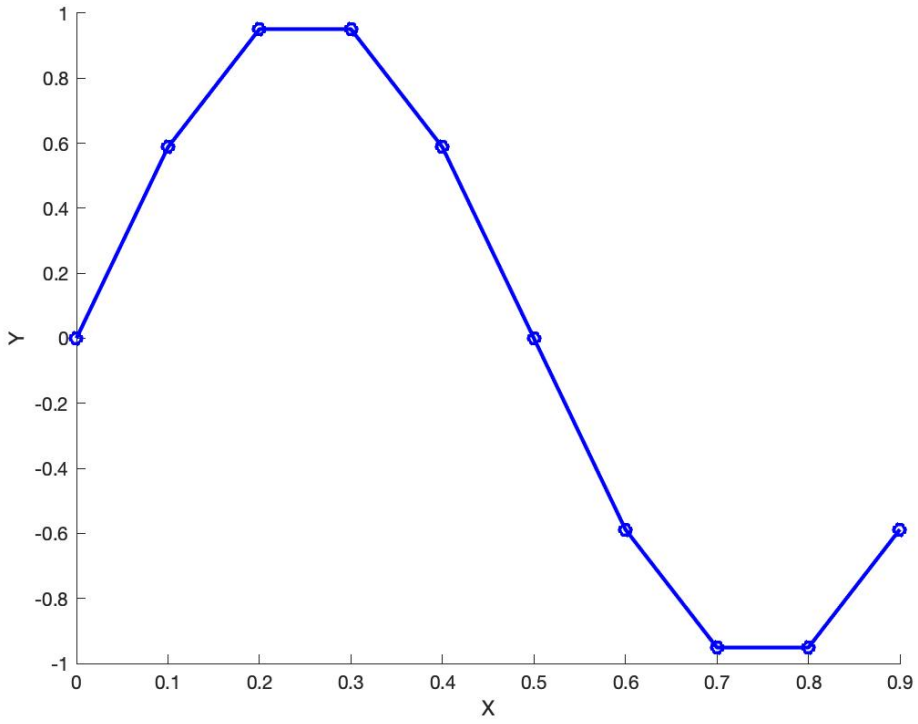
Assignment 5

Scientific Computing with MATLAB
due: Nov 5, 2019

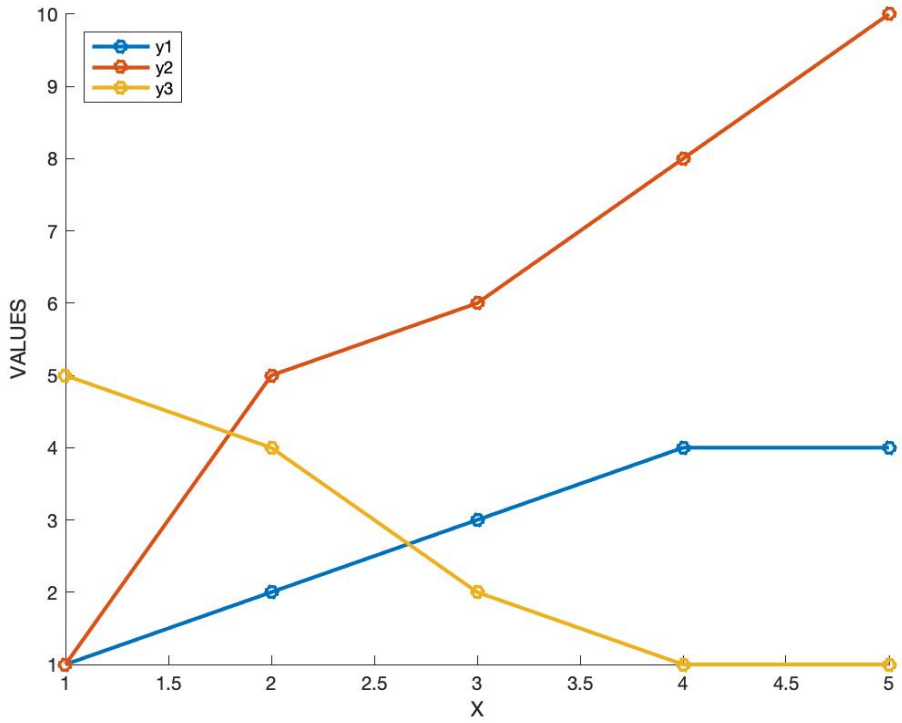
Graphics in MATLAB

Questions 1,2,3,4,6 are worth 1 point and question 5 is worth 2 points.

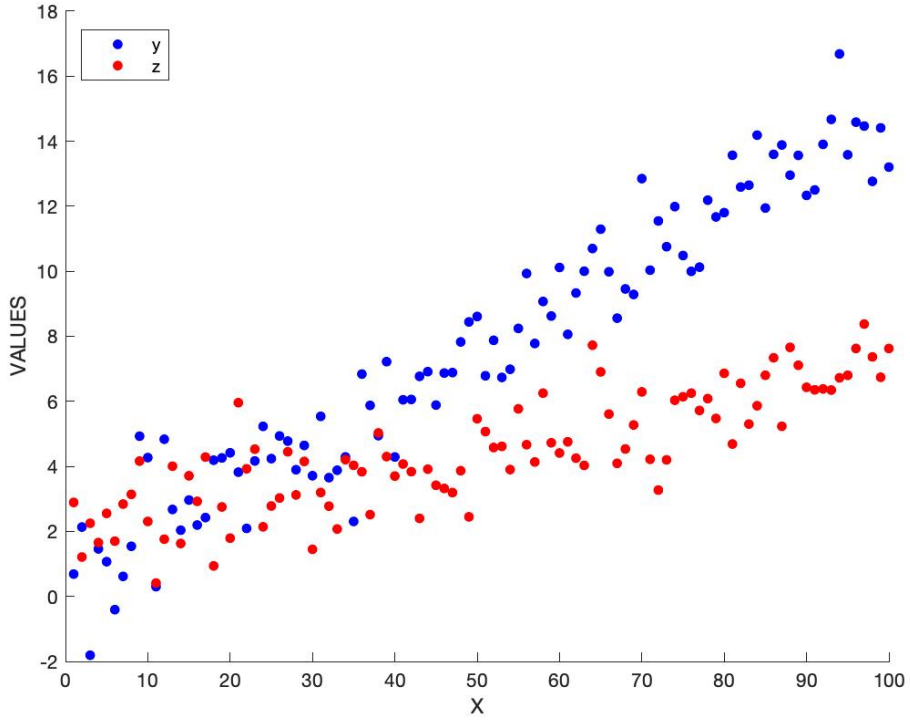
1. Define a vector `x` containing 10 values starting at 0, ending at 0.9, in increments of 0.1.
   Define a vector `y` that is equal to `sin(2*pi*x)`.
   Generate a line plot with `x` on the horizontal axis and `y` on the vertical axis. Generate a plot using blue circles at each data point, connected by blue solid lines, with a line width of 2.0. Label the horizontal axis “X” and the vertical axis “Y”.



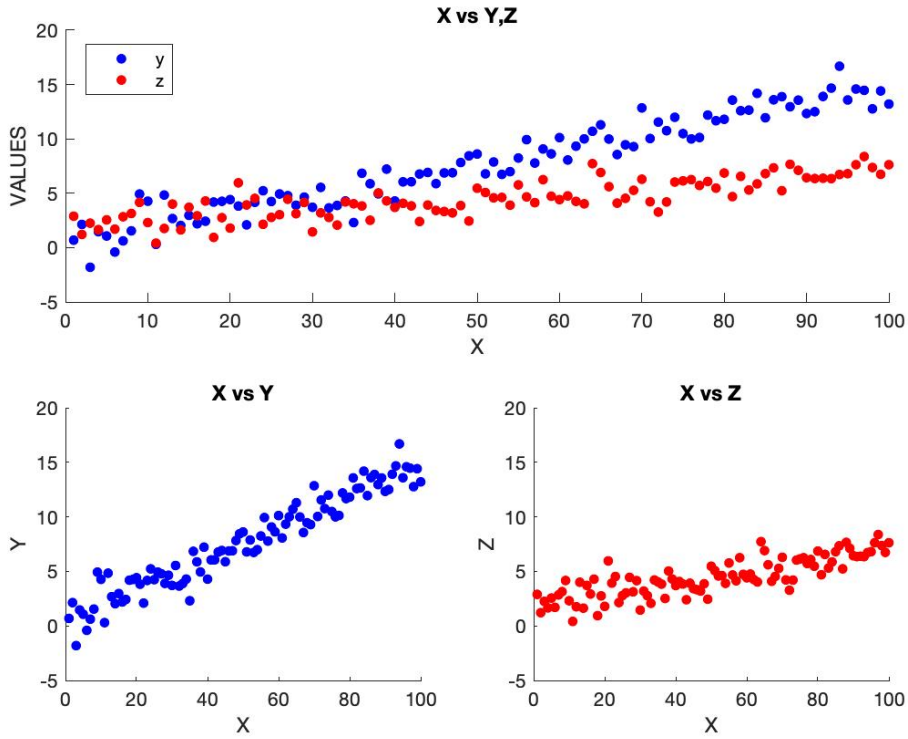
2. Define a vector `x [1,2,3,4,5]`. Define a vector `y1 [1,2,3,4,4]`, `y2 [1,5,6,8,10]` and `y3 [5,4,2,1,1]`.
   Generate a multi-line plot using open circles connected with solid lines. Label the horizontal axis “X” and the vertical axis “Values”. Add a legend to the plot with labels “y1”, “y2”, and “y3”.



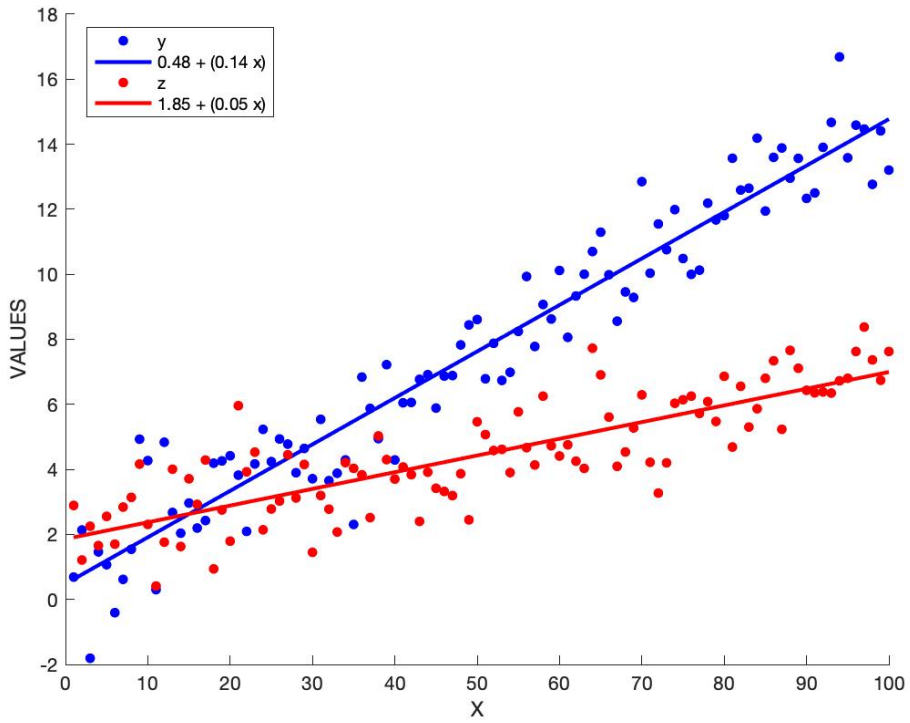
3. Define `x` as a vector starting at 1 and ending at 100 in increments of 1. Define `y` as a vector equal to `(x * 0.15) + N` where `N` is a vector of random values chosen from a gaussian distribution with mean 0 and standard deviation 1. Let `z` be equal to `((x * 0.05) + 2) + N2` where `N2` is a vector of random values chosen from a gaussian distribution with mean 0 and standard deviation 1.5.
   Generate a scatterplot of `x` vs `y` and `x` vs `z`, and include a legend. Label the horizontal and vertical axes as shown and include a legend as shown.



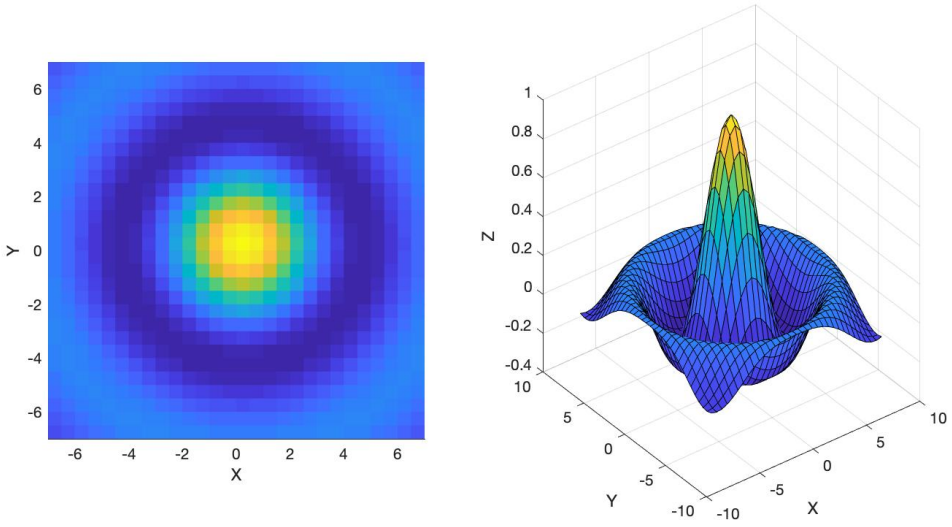
4. Replot the data from question 3 using subplots, as shown below. Be sure to use the indicated axis limits on all three subplots.



5. Regenerate the plot from question 3 and add regression lines to each dataset. Note there are many ways in MATLAB to fit a line to data, including the `fit` function, or the `polyfit` function, or even by doing the matrix algebra manually. There is also a GUI-based curve fitting tool called `cftool`. Use whatever method you wish. Add a legend and include the equations of the lines of best fit.



6. Define `x` and `y` over a grid `[-8,8]` in steps of `0.5`. Hint: use the `meshgrid()` function. If you've done it right, `x` and `y` should each be matrices with 33 rows and 33 columns. Define `r` equal to $\sqrt{(x^2+y^2)}+0.00001$. Define `z` as `sin(r)/r`. If you've done it right, `z` should have the same dimensions as `x` and `y` (i.e. 33 rows by 33 columns).
   Generate a surface plot that looks like that shown below. Hints: the command `view(2)` will show a 2D top-down view of a surface plot. Hint: the plotting options `'edgecolor','none'` will get rid of the black lines between facets.



Please submit your MATLAB script to OWL.