**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project #7**

**ATMS 261 - Computer Applications in Meteorology Due: Fri. Mar. 6, 2020**

**Microsoft Excel Exercises**

1. Driver Initials:\_\_\_\_\_\_\_\_ Passenger Initials:\_\_\_\_\_\_\_\_

* Open a new Excel spreadsheet (naming it “proj7\_atms261.xlsx”) and calculate the amplitude of three cosine waves spanning the east-west (x-axis) domain from gridpoint (row) = 1 to gridpoint (row) = 20, having a maximum amplitude of 10.0
* Create a scatterplot (with straight lines and markers) of the 3 cosine waves with gridpoint (row) on the x-axis, spanning the values 1 to 20 and with the wave amplitude on the y-axis, with minimum and maximum values of -11.0 and +11.0, respectively
* Label the data series, on the right-hand-side of the graph, as ‘Cosine, npt=20’
* Calculate the amplitude of three cosine waves spanning the domain from gridpoint (row) =1 to gridpoint (row) = 200, having a maximum amplitude of 10.0
* Create a scatterplot (with straight lines and ***NO*** markers) of the 3 cosine waves with gridpoint (row) on the x-axis, spanning the values rs1 to rs20 and with the wave amplitude on the y-axis, with minimum and maximum values of -11.0 and +11.0, respectively [note: rs1 and rs20 represent **a re-scaled x-axis grid system** in which rs1 coincides with gridpoint (row) value = 1 and rs20 coincides with gridpoint (row) value = 200, see “Project 7a Example” on the ATMS 261 web page]
* Label the data series, on the right-hand-side of the graph, as ‘Cosine, npt=200’
* Why is there a difference between the two data series (npt=20 and npt=200)? Which plot gave a more accurate depiction of the 3 cosine waves?
* How is horizontal grid resolution in our computer weather models related to the scale of weather features that we can predict? Why don’t we just use a very fine horizontal grid resolution in our operational computer weather models (e.g., NAM, WRF, GFS)?
* Save the plot as “proj7a\_atms261.png” graphics image using MS Powerpoint
* Click on WinSCP to initiate a Secure FTP session to “blizzard.atms.unca.edu”
* Click on “Operation” 🡪 “Go to Folder…” entering “/home/atms261/” under “Enter Folder Name” {click “OK”}
* Copy your Excel spreadsheet file and PNG plot image to the proper “GroupNN” subdirectory on ‘blizzard’ {do **NOT** exit WinSCP}

1. Driver Initials:\_\_\_\_\_\_\_\_ Passenger Initials:\_\_\_\_\_\_\_\_

* click on the proper “project04” folder in right-hand window via WinSCP and select “Binary” in the “Transfer Settings” pull-down menu at the center-top of the window
* right click individually on each of the ***correct*** “output\*.txt” files from the FORTRAN project (#4), there should be a total of four files, and click on “Download” to your Windows computer [**NOTE**: you might need to make corrections to your FORTRAN program first]

**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project #7**

**ATMS 261 - Computer Applications in Meteorology Due: Fri. Mar. 6, 2020**

**Microsoft Excel Exercises (continued)**

* end the **WinSCP** session after having transferred the four ***correct*** “output\*.txt” files
* open MS Excel and ingest each of the “output\*.txt” files into separate Excel files or tabs using the sequence
* File 🡪 Open 🡪 outputNNNNNN.txt
* Click “Next” multiple times under the “Text Import Wizard” window until “Finish” is the final option
* Create new columns with a multiplying scale factor (10SF) so that the forward-differencing (**FD**) and centered-differencing (**CD**) advection results have the same order of magnitude as the analytic advection values
* highlight the appropriate distance (x) and advection (y) columns to create an “XY (scatter)” plot using the option “with data points connected by lines **without markers**”
* save file using “save as” option with the “Microsoft Excel Workbook” file format
* you should have four different Excel files or tabs for each of the four “outputNNNNNN.txt” files with a scatter plot corresponding to the advection data of each of the files
* use MS Powerpoint to create \*.gif images of the XY scatter plots corresponding to files “output000004.txt”, “output000040.txt”, “output000400.txt”, and “output004000.txt” naming them “adv0004.gif”, “adv0040.gif”, “adv0400.gif”, and “adv4000.gif”, respectively. Use WinSCP to send the Excel and “adv####.gif” files back to your “GroupNN” subdirectory on “blizzard.” Note below what each of the Series curves on your “adv####.gif” figures represents
* Series 1:
* Series 2:
* Series 3:
* compare the four different plots to answer the following questions
* Which plot(s), if any, can you *not* detect differences between the analytic, the FD and the CD advection plots? [focus on whether you can detect the three colors associated with the advection plots]
* What seems to be the relationship between the horizontal grid resolution (number of grid points) and the ability of FD or CD to accurately estimate the analytic advection solution?
* Between FD and CD, which differencing scheme seems to consistently do a better job of estimating the analytic advection solution?

**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project #7**

**ATMS 261 - Computer Applications in Meteorology Due: Fri. Mar. 6, 2020**

**Microsoft Excel Exercises (continued)**

* Which plot(s), if any, do both the FD and CD estimates fail to accurately represent the analytic advection solution?
* If you were designing an atmospheric computer model, which advection scheme (FD or CD) and what horizontal resolution (number of grid points) would you select?

1. Driver Initials:\_\_\_\_\_\_\_\_ Passenger Initials:\_\_\_\_\_\_\_\_

* Repeat the text incorporation and plotting process in Excel this time using text from the 0000 UTC 3 March 2014 and 0000 UTC 4 March 2014 GSO (Greensboro, NC) *Upper Air Soundings* that you’ll get from the **University of Wyoming**
* Graph the data, making them into .gif images, with pressure as the vertical coordinate increasing ***downward*** toward the bottom of the graph. Add labels “Air and Dewpoint Temp. (degC)” along the x-axis, “Press. (hPa)” along the y-axis, and “hhhh UTC d March 2014 GSO Sounding” as the title along the top of the plot
* What happened between the launch times of the two soundings at Greensboro, NC?

# The deliverables for Group Project#7 [ put files in your “GroupNN” subdirectory on ‘blizzard’]:

1. Excel spreadsheet file and PNG plot of the cosine exercise, along with answers to questions written on this answer sheet
2. Excel spreadsheet file(s), “adv0004.gif”, “adv0040.gif”, “adv0400.gif”, and “adv4000.gif” plots, along with answers to questions written on this answer sheet
3. Excel spreadsheet file(s) and GSO vertical profile T and Td plots at 0000 UTC 3 and 4 March 2014, along with answers to questions written on this answer sheet

Next session: Spring Break (then **Minitab/Matlab**)