

ATM S 310

HOMEWORK #3 (due 12:29 PM 11/03/2023)

Introduction: When studying severe storms, there are several “parameters” that are readily available via models or observational data that can be used in forecasting. Some of them used in this homework include 0-1 km storm-relative helicity (a measure of rotation potential near the ground – higher is more favorable for tornadoes!), 0-6 km wind shear (a measure of how dramatically winds change with height – higher is more favorable for tornadoes!), and mixed-layer CAPE values (convective available potential energy is a measure of how much energy is available to a storm – higher is more favorable for tornadoes!).

Six files have been provided for you in this assignment (you can find them under Files in Canvas or in the Assignments tab); you will need them all for this assignment:

- **hw3_01srh1.txt:** Provides 0-1 km storm-relative helicity values ($\text{m}^2 \text{s}^{-2}$) for 10 tornadoes in February.
- **hw3_01srh2.txt:** Provides 0-1 km storm-relative helicity values ($\text{m}^2 \text{s}^{-2}$) for 10 tornadoes in May.
- **hw3_06shr1.txt:** Provides 0-6 km wind shear values (kt) for 10 tornadoes in February.
- **hw3_06shr2.txt:** Provides 0-6 km wind shear values (kt) for 10 tornadoes in May.
- **hw3_mlcape1.txt:** Provides mixed-layer CAPE values (J kg^{-1}) for 10 tornadoes in February.
- **hw3_mlcape2.txt:** Provides mixed-layer CAPE values (J kg^{-1}) for 10 tornadoes in May.

Upload all of these .txt files into the same Jupyter folder where you'll be working!

1. **(10 points)** Using the methods shown in Week 05 M's lecture, write code to calculate the mean, median, standard deviation, interquartile range, skewness, and kurtosis of each text file.

HINTS: You can copy-paste the relevant code directly from the Jupyter notebook! In section 9.2, the **readdata()** function will come in handy here, as will the code in section 9.5

2. **(10 points)** Using what we learned about these statistics in section 9.1 of Week 05 M's lecture, discuss the February tornadoes, the May tornadoes, and the differences between the two datasets (if any).

HINTS: Discuss each of the statistics for each parameter (SRH, shear, and CAPE) for both datasets. Do there seem to be outliers? That is, are the median and mean similar? How about the standard deviation and the IQR? What do kurtosis and skewness show? How are the May and February datasets similar? How do they differ?