<mark>**Students, you will first be given a problem very similar to this in the first part of Exam 1 on September 24.**</mark>

Part 1 of Exam 1

1. Download wheat yield data for all Oklahoma counties at
    http://seeds.okstate.edu/SeedsPPP/data/Oklahoma Wheat Yield (all counties).xlsx
2. Do all your work in this file, for this will allow me to determine if you copy and pasted anyone else's work into your file. You can rename it if you want.
3. Save these data and your work, for you will need to email me your file and you may need to finish your work at home.
4. Do not copy and paste anything from another file into this file! You will receive a zero if you do. You *can* copy and paste within this document.
5. When you are finished please raise your hand so that I can come see your computer and check your work.
6. When your work is complete, email your Excel file to bailey.norwoodCLASS@gmail.com with the subject "<Last name, first name>; Part 1 of Exam 1."
7. If you do not complete the assignment by the end of class, I still want to come see your computer to see how much you accomplished, and I still want you to immediately email me your Excel file with the subject "Not Finished; <Last name, first name>; Part 1 of Exam 1" to bailey.norwoodCLASS@gmail.com before leaving class. When you get home, please finish the assignment as quickly as possible and email it to me at the same email address, using the subject shown in Item 6.

WHAT DO I WANT FROM YOU? One thing: a histogram of the simulated profits, with the average simulated profit in the chart title. If something is wrong with the histogram, I will then inspect your work to award partial credit.

The Problem
You work for a consulting company who has been hired to assess the feasibility of a wheat cooperative which would specialize in combining the harvests of many farmers and negotiating a favorable price on their behalf. You are working for the 25 farmers in **Kingfisher County** who would own the cooperative. If the cooperative is established, each farmer would sell all their wheat through the cooperative. A favorable price can only be negotiated if it can sell a large amount of wheat, so the profitability of the cooperative depends on the amount of wheat the farmers produce.

IMPORTANT: These 25 farmers work 30,000 acres of wheat in Kingfisher County, and you may assume each farmers' average yield equals the average yield for Kingfisher County. If average yields in year 2009 equals X, then the **total bushels of wheat the cooperative will manage in 2009 is (30,000 acres)(X bushels/acre).**

<u>(A) Per bushel premium</u>
Your work with transportation wheat marketing consultants suggests that the premium the cooperative commands—that is, the price the cooperative receives minus the market price—depends on the amount of wheat the cooperative is able to obtain, as shown in the following table.

Total bushels of wheat handled by the cooperative	Wheat Premium ($ / bu)
600,000 bushels or less	$0.00
(600,000 , 800,000]	$0.03
(800,000 , 1,000,000]	$0.05
(1,000,000 , 1,200,000]	$0.07
Greater than 1,200,000	$0.10

<u>(B) Per bushel cost</u>
Running the cooperative entails costs. These costs include management and wheat storage facilities. The per bushel cost of the cooperative depends on the amount of wheat it handles, and declines with more wheat because some fixed costs like management are spread over more bushels. The farmers of course pay this cost, and each farmer is charged a cost equal to the cooperative's per bushel cost, for each bushel the farmer produces. The per bushel cost, you are told, is estimated to be…

If total wheat for cooperative is 1,100,000 bushels or less:
Per bushel cost of running cooperative = 0.12 – 0.0000001*(total bushels handled by cooperative).

If total wheat for cooperative is more than 1,100,000 bushels:
Per bushel cost of running cooperative = 0.005

<u>(C) Feasibility study using historical simulation</u>
Your job is to use a historical simulation to project the potential feasibility of the cooperative, using wheat data from Kingfisher County from 1974 to 2008. By assuming each farmer in the cooperative experiences a yield equal to the average yield for Kingfisher County, and knowing that the total acres in wheat for all cooperative farmers is 30,000, you can calculate the total amount of wheat the cooperative would have handled, if it had existed in any year between 1974 and 2008.

The farmer receives the per bushel premium in (A) and pays the per bushel cost in (B). From this you can estimate the profits the farmer realizes by selling all their wheat through the cooperative, relative to selling individually on the market, on a per bushel basis.

To conduct this feasibility analysis, first ask: based on the 1974 wheat yield, how much wheat would the cooperative produce? Then calculate the corresponding simulated profit for 1974. Ask this of every other year also, and then interpret the simulated profits by taking the average simulated profit and creating a histogram of the simulated profits.

What do I want from you? One histogram of the simulated profits, with the average simulated profit in the chart title. If something is wrong with the histogram, I will then inspect your work to award partial credit.