The Tire Problem

A tire company wants to offer a guarantee that their tires will last 40,000 miles. They sell their tires to the retailers generally for about $80 each and they get sold to customers for about $120 each. The guarantee would be pro-rata (meaning they pay for the amount short as a percent of 40,000…so if a tire lasts 20,000 miles, the customer gets ½ their money back). Management wants to know how much the program cost them? They do know that their tires have a mean life of 46,000 miles with a standard deviation of 8,600 miles.   You may need to make other assumptions about the company to determine the cost.

This project is done individually but feel free to collaborate with classmates.

Your work product should be as follows:
- A 1-page Google Doc write up (shared with me as an editor and link posted to the shared work spreadsheet). This writeup should be written as though you are an employee of the tire company, sending this memo to tell a management team your thoughts on the costs of this guarantee program.

    o Your Google Doc may have one addition page with one or more well-labeled graphs/charts.

    o Your Google Doc may have a separate page with a list of assumptions about this particular tire company.

- Somewhere in your Google Doc include a link to a **well-labeled, organized spreadsheet** (also Shared with me as an editor). If you do your work without a spreadsheet, or if you use a program instead of a spreadsheet, make sure your program has comments so that I can follow it and paste the program as an appendix to your Google doc.

Considerations/Assumptions/etc.

Goal – Make sure students can use the normal. Outputs on the Normal pdf not very helpful…need accumulated area under pdf which is the same as difference between cdf output values.

> Note: It is possible to avoid using ranges of miles driven if you create new function that is the miles times the pdf output values and integrate that new function. Desmos can handle this easily.

Write-Up
- How technical should the write-up be? This depends a lot on who the memo is going to… some managers like to dig into numbers and technical ideas…others do not.

Assumptions/Considerations
- All ranges of miles driven correctly represented by the normal – assumes tires don't fail right out the door
- There needs to be a money assumption…using the $120 assumes that the retailer is not part of the guarantee.
- Assumption about costs to run the program beyond money returned to the customer: Marketing costs to make sure retailers and/or customers know about the guarantee? Programming Costs? Call center/processing center to handle refunds?
  - Fixed Costs vs. Variable Costs – To consider this you would need to have some info (assumption) about the number of tires sold.
- With the guarantee change customer behavior? Will more tires fail early?
- Will customers seek a refund if it is only for a few bucks?
- Will customers buy more new tires if they are already replacing a tire?
- Will the presence of a guarantee cause more customers to buy a tire?

Sales - More customers –
People might lead to more sales

Not everyone will ask their money back – especially if they are close to 40,000 miles