Dear Calculus Students,

After the verdict against one of our competitors a few years ago, my company, which owns a series of quick-dining establishments, has been hit with a series of copy-cat lawsuits. We need some technical expertise on one of these matters, and your enterprising and resourceful professor referred me to you.

The plaintiff, whom I refer to as R. Clumsy for legal reasons, was the passenger in an automobile that stopped at one of our drive-through windows early one morning for coffee. Mr. Clumsy placed the coffee in a cupholder for several minutes, held the coffee cup in his hands for a short time, and then he spilled the coffee. He maintains that the coffee was much too hot, and he is suing for $200,000 for emotional distress and dry cleaning bills.

I would like to know how credible his story is. While we do serve our coffee at 160°F, I do not believe that the coffee was above the industry standard of 140°F when Mr. Clumsy spilled his coffee. He claims that it was exactly 7:58 AM when the coffee was poured, and when he spilled the coffee, some of it fell on his watch, a cheap Timex ripoff, which stopped at precisely 8:08 AM. He says that he left the coffee in the cupholder for five minutes, and held it in his hands for another five minutes before spilling it. I would like to be able to raise a reasonable doubt about the credibility of his story, either by showing that the temperature was not above the industry standard, or by showing that if the times are slightly different than he claims, then the coffee was not too hot.

Assuming Mr. Clumsy’s scenario is correct, I would like to know if the temperature of the coffee was above the industry standard when he spilled it. I am doubtful that he remembered the times exactly. In particular, I seriously doubt that the coffee was in the cupholder and his hands for exactly five minutes. What would the temperature be if the breakdown were four minutes in the cupholder and six minutes in his hands? Six minutes in the
cupholder and four minutes in his hands? Seven minutes in the cupholder and three minutes in his hands? I am also a little dubious about his claim that the coffee was poured at exactly 7:58 AM. What would the temperature have been if the coffee was poured at 7:56 AM instead? In your report, I would like your expert opinion on whether or not there exists a reasonable doubt that the coffee was above 140°F. Your report should also include an explanation of the model used to predict the temperature, so that our lawyers can convince the jury of the accuracy of the analysis.

To help you out, the investigators in our Fact Finding Department have uncovered the following information: Mr. Clumsy lives 7.8 miles away from the restaurant, so you can assume that the passenger compartment of the car had warmed to a comfortable 72°F, which is the same temperature that we keep the restaurant. Further, if you take a fresh, delicious, aromatic cup of our coffee and place it in a room at 72°F, then it will cool to 149°F in four and a half minutes. We also asked Mr Clumsy to hold a thermometer in his hands just like he held coffee. We discovered that the temperature was 92.3°F.

I understand that this is a busy time of the semester for you, but I would greatly appreciate your report by November 7, since the trial is set to begin the following week.

Your sincerely,

J. I. T. Box