MATH1007
Homework 6
Due Friday, October 21

When submitting homework, please remember the following:

• Show all work leading to each solution.

• *You must use a staple* (not paper clip) if your answers are longer than a single page.

• Do not submit crossed-out or sloppy work.

• Do not submit ripped or torn pages.

• Be sure to submit your own work.

1. Suppose for a normally distributed data set, you are told that 95% of the data lies between 63.7 and 81.4. Find the mean μ, the median M, the standard deviation σ, and the two quartiles Q_1 and Q_3.

2. Suppose that in a normally distributed data set, the median M is 43.2 and the 11th percentile is 23.8. What is the 89th percentile?

3. A fair coin is tossed 4000 times. (The phrase "fair coin" means that heads and tails are equally likely.) Let the random variable X record the number of heads.
(a) Find the mean μ and the standard deviation σ of X.
(b) Find numbers A and B so that the chances that X will be between A and B are 68%.
(c) Find numbers C and D so that the chances that X will be between C and D are 95%.
These answers are unlikely to be round numbers. Please work to 4 decimal places.

4. A fair die is rolled 200 times. (The phrase "fair die" means that each of the 6 sides of the die is equally likely to appear.) Let the random variable Y record the number of times that the number 4 appeared.
(a) Find the mean μ and the standard deviation σ of Y.
(b) Find numbers A and B so that the chances that Y will be between A and B are 68%.
(c) Find numbers C and D so that the chances that Y will be between C and D are 95%.
These answers are unlikely to be round numbers. Please work to 4 decimal places.

5. Suppose that the probability that a Samsung telephone will explode is 0.10. Out of a shipment of 400 phones, find the probability that:
(a) at most 40 will explode.
(b) more than 52 will explode.

6. Recall this problem from an earlier homework:

> I have a $350,000 mortgage with a 6.75% APR, compounded monthly, and a 25-year term.

(a) After I have made 12 payments (1 year of payments), how much money have I paid to the bank?
(b) How much of the money that I paid to the bank in that first year was interest, and how much was principal?

7. *The New York Times* recently had a story about retirement savings. It emphasized that it is never too late to begin saving. Consider these examples:

(a) Suppose that a 51-year old person deposits $30,000 each year in a bank account until she turns 65. For simplicity, assume 5% APR, compounded annually, with 15 deposits and 14 interest payments. How much is in the bank when she makes her 15th deposit as she turns 65? NOTE: You can actually do this calculation by hand, because you only need to compute 15 years worth of interest and deposits. I recommend instead that you do this by adding a geometric series, and checking by doing the computation year by year.

(b) Suppose instead that a 36-year old person deposits $15,000 each year in a bank account until she turns 65. For simplicity, assume 5% APR, compounded annually, with 30 deposits and 29 interest payments. How much is in the bank when she makes her 30th deposit as she turns 65? NOTE: I recommend doing this by adding a geometric series.