Exercise 4A.1

There are three components of the GRE general test - Analytical, Verbal, Quantitative. Suppose the scores of prospective graduate students from Ohio have the following distributions:

Analytical is $N(580, 2500)$
Verbal is $N(670, 900)$
Quantitative is $N(650, 1600)$

(a) What is the expected total score for a randomly selected student from Ohio?

(b) Suppose 3 prospective students are chosen at random. Let Y be the sum of their three verbal scores. What is the expected value and standard deviation of Y?

Exercise 4A.2

The number of people wishing to check out at a supermarket averages 3.4 people per 10 minutes at peak time. Let X be a random variable indicating the number of people checking out in 10 minutes.

(a) What is the distribution of X? (Be specific.)

(b) What is the expected number of people who will check out in a 20 minute interval? (Hint: think of this as two independent 10-minute intervals.)

Exercise 4A.3

Let X be a random variable indicating the minutes after 8am that an instructor starts class. Suppose it is known that $E(X) = 2.3$ and $\mathrm{Var}(X) = 1.44$. Further assume that the start time of different days are independent of each other.

(a) Let Y be the total number of minutes late over a random sample of 20 class days. What are the expected value and variance of Y?

(b) What are the expected value and variance of $Y/20$? (This is the average minutes late over the 20 days.)

Exercise 4A.4

Suppose that among all OSU undergrads, the mean age is 20.5 years with a standard deviation of 2.2 years. If you randomly select 25 OSU undergrads, what is the probability that the mean of your sample will be between 20 and 21?

Exercise 4A.5

A hospital administrator believes that for a particular hospital the average ER wait time is 3 hours and that the standard deviation is 1.5 hours.

(a) If this is true and you sample 20 patients, how likely is it that your sample will have a mean wait time of greater than 3.5 hours?

(b) What is this probability if you sample 50 patients instead?

(c) (Challenge Problem) If this is true and you sample 20 patients, the middle 95% of all sample means would be expected to fall between what two numbers?