# Lesson 10. A Diversion

- We've been discussing generating random numbers (i.e. values from a Uniform$[0,1]$ random variable)
- Having effective methods for generating and testing pseudo-random numbers is extremely important for (stochastic) simulation
- Next up: generating values from an arbitrary random variable
- Today, let's take a break and solve a problem with simulation

**Problem.** The Midshipman Store wants to determine how many "Beat Army" t-shirts to order for next year. It costs \$10 to order each t-shirt but the manufacturer only sells them in lots of 50. The t-shirts will be sold for \$18. Unsold t-shirts are returned for \$3. Due to the necessary manufacturing lead time, t-shirts must be ordered before the demand is known. Based on previous years, the demand for t-shirts has the following probability distribution:

| Demand | 50 | 100 | 150 | 200 | 250 | 300 | 350 |
|---|---|---|---|---|---|---|---|
| Probability | 0.01 | 0.06 | 0.24 | 0.38 | 0.24 | 0.06 | 0.01 |

a. In Excel, simulate the t-shirt demand for a given year and compute the resulting profit when the store orders 50, 100, 150, 200, 250, 300, and 350 t-shirts.

b. Replicate the simulation 50 times to obtain an estimate of the expected (or average) profit when the store orders 50, 100, 150, 200, 250, 300, and 350 t-shirts. Do the average profits you computed make sense?

c. How many t-shirts should the store order to maximize its profit from "Beat Army" t-shirts? Does your answer make sense?

d. Investigate how your answer changes when the ordering cost, selling price, and salvage price change.