Normal Distribution with R — Workshop

The following exercises use the R functions `pnorm`, `qnorm`, *and* `rnorm`.

1. **Percent below a location.** In the USA, heights of men are approximately normally distributed with an average of 70 inches and a standard deviation of 3 inches, i.e.,

   $$\text{height} \sim N(70, 3).$$

   The function `pnorm(x, mean, sd)` computes the percentile (percent below) a location x on a bell curve with a given mean and standard deviation. Use it to compute the percentile of a man who is exactly 6 feet tall (72 inches).

2. **Percent above a location.** What percent of men are taller than 75 inches?

3. **Percent between two locations.** Annual rainfall in Farmville, VA is approximately normally distributed, with a mean of 44 inches and a standard deviation of 7 inches, i.e.,

   $$\text{rainfall} \sim N(44, 7).$$

   What is the probability that next year will get between 40 and 50 inches of rain? Write the answer using the `pnorm` function and then give the number.

4. **Converting percents to locations.** The function `qnorm(q, mean, sd)` returns the location of a quantile q on a bell curve with given mean and standard deviation. For example, `qnorm(0.25, 44, 7)` would return the location at the 25th percentile on a bell curve with mean $\mu = 44$ and standard deviation $\sigma = 7$. Use the `qnorm` function to determine how tall a man in the 90th percentile for height would be.

5. **Random samples from a normal distribution.** The function `rnorm(n, mean, sd)` generates n random values from a normal distribution with given mean and standard deviation. Use this to simulated a sample of 100 years of rainfall for Farmville. How many of the years in your simulation got more than 50 inches of rain?