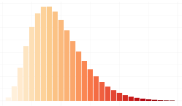

Equitable Equations: *The standard normal distribution*

Use R for all problems. Always include both code and output.

Problem 1

Compute the following in $N(0, 1)$.

(a) $P(Z < -0.6)$ pnorm(-0.6) = 27.4%

(b) $P(Z > 1.3)$ 1 - pnorm(1.3) = 9.68%

(c) $P(-1.2 \leq Z \leq 2.1)$. pnorm(2.1) - pnorm(-1.2) = 86.7%

Problem 2

The speed of a car on cruise control has a normal distribution with mean $\mu = 72$ mph and standard deviation $\sigma = 1.1$ mph.

(a) Find the Z-score corresponding to a speed of 70 mph.

$z = \frac{70-72}{1.1} = -1.8$

(b) Compute the probability that the car is traveling more than 70 mph at a random moment using the Z-score from part (a).

1 - pnorm(-1.8) = 96.5%

(c) Check your answer from part (b) using $N(72, 1.1^2)$.

1 - pnorm(70, 72, 1.1) = 96.5%

Equitable Equations: *Inverse normal calculations*

Problem 1

Find the z-score that has 44% of the distribution to its left. qnorm(.44) = -0.151

Problem 2

Find the value in $N(12, 3^2)$ that has 87% of the distribution to its right. qnorm(1 - .87, 12, 3) = 8.62

Problem 3

The following problem is taken from *OpenIntro Statistics*, Fourth Edition, by David Diez, Mine Çetinkaya-Rundel, and Christopher Barr. Pay what you want or download for free at `https://www.openintro.org/book/os/`.

> **4.7 LA weather, Part I.** The average daily high temperature in June in LA is 77°F with a standard deviation of 5°F. Suppose that the temperatures in June closely follow a normal distribution.
>
> (a) What is the probability of observing an 83°F temperature or higher in LA during a randomly chosen day in June? 1 − pnorm(83, 77, 5) = 11.5%
>
> (b) How cool are the coldest 10% of the days (days with lowest average high temperature) during June in LA? qnorm(0.1, 77, 5) = 70.6
>
> The coldest 10% of days are below 70.6°F

Problem 4

Small bags of chips have weights that are normally distributed with mean $\mu = 1.55$ oz and standard deviation $\sigma = .06$ oz.

(a) What is the probability that a randomly-selected bag of chips weighs less than 1.50 oz? pnorm(1.50, 1.55, 0.06) = 20.2%

(b) What is the 98^{th} percentile of weights? qnorm(.98, 1.55, 0.06) = 1.67oz