MONT 105N – Analyzing Environmental Data
Discussion – Normal Probabilities using Tabulated Values
February 26, 2020

Background

Probabilities for a standard normal random variable (i.e. normal distribution with $\mu = 0$, $\sigma = 1$) are given in the table on the back of this sheet.

Important Fact: If Y is normal with mean μ and standard deviation σ, then

$$Z = \frac{Y - \mu}{\sigma}$$

is standard normal, and the table can be applied to Z. In today's discussion, you will practice using the table to answer questions about normally distributed quantities.

Discussion Questions

A) Let Z be a standard normal.

1) Find $P(.23 < Z < .59)$
2) Find $P(-2.13 < Z < -0.56)$
3) Find c such that $P(Z > c) = .05$ (Note: there's no such c exactly appearing in the table, but you can estimate c with the information you have there.)
4) Find d such that $P(-d < Z < d) = .98$ (The same comment as in part 3) applies here.)

B) Y is normally distributed with mean $\mu = 6$ and $\sigma = 2$. Find

1) $P(6 < Y < 7)$
2) $P(4 < Y < 5)$
3) $P(4.5 < Y < 7.5)$

C) SlimMints (yum!) are sold in two-packs with a stated label weight of 20.4 grams. The actual weights of the packages are normally distributed with mean $\mu = 21.37$ and SD $\sigma = .4$. Let Y be the weight of a single package selected at random from the production line.

1) What is the probability $P(Y > 20.4)$ (that is, greater than the stated label weight)?
2) If the company lowered the actual weights of the packages so that $\mu = 20.4$ and $\sigma = .4$, what would the probability be of getting a package with weight $Y < 19$ (noticeably "light")?
3) If $n = 10$ packages of mints are chosen at random from the production line, what is the probability that 6 of them will have weight < 19?