

MONT 105N – Analyzing Environmental Data  
Discussion – Normal Probabilities using Tabulated Values  
March 15, 2019

*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  $\mu$  and standard deviation  $\sigma$ , 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  $< 19$ ?