

Mathematics 375 – Probability and Statistics 1
Discussion 4 – Using the Standard Normal Table
October 26, 2005

Background

Right-hand tail probabilities for a standard normal random variable (i.e. normal distribution with $\mu = 0$, $\sigma = 1$) are given in the tables printed inside the front cover and on page 792 of the text. 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 $P(-2.13 < Z < -0.56)$.
- 2) Find c such that $P(Z > c) = .05$
- 3) Find c such that $P(|Z| < c) = .75$.

B) Y is normally distributed with mean 6 and variance 16. Find

- 1) $P(Y < 7)$.
- 2) $P(5 < Y \leq 8)$.
- 3) $P(|Y - 4| < 1)$.

C) SlimMints 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 variance $\sigma^2 = .16$.

- 1) Let Y be the weight of a single package selected at random from the production line. What is the probability $P(Y > 22.07)$?
- 2) Suppose that 15 packages are selected independently. Let X be the number that weigh less than 21 grams. What is the probability $P(X \leq 2)$.
- 3) In order to cut costs, the manufacturer of SlimMints wants to change the production process to reduce the actual mean weight μ , while keeping the same 20.4 gram stated label weight. Market research finds that customers will not notice this if the actual weight of a package is less than the stated label weight no more than 20% of the time. What is the lowest value of μ for which $P(Y < 20.4) \leq .20$?

Assignment

Group writeups due at end of class.