Mathematics 375 – Probability and Statistics 1
Discussion 3 – Using the Standard Normal Table
October 26, 2009

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 smallest value of μ for which $P(Y < 20.4) \leq .20$?

Assignment

    Group writeups due at end of class.