

Stat 110 – Normal Examples

1. For all college seniors and graduates who took the GRE between October 1, 1989, and September 30, 1992, scores for the verbal ability portion followed a normal distribution with mean 497 and a standard deviation of 115.
 - a. What is the probability that a test taker scored less than a 648?
 - b. What is the probability that a test taker scored greater than a 648?
 - c. If Bob was in the 60th percentile, what was his score on the GRE?

2. In the Edinburgh newspaper the *Scotsman* on March 8, 1994, a headline read, "Jury urges mercy for mother who killed baby". The baby had died from improper care. One of the issues in the case was that "the mother...had an IQ lower than 98 percent of the population, the jury had heard." From this information, compute the mother's IQ.
 - a. What percentile was the mother's IQ?
 - b. What's the z-score associated with this percentile?
 - c. Calculate the mother's IQ. (This distribution has a mean of 100 and a standard deviation of 16.)

3. Ian Stewart reported on a problem posed to a statistician by a British company called Molegon, whose business was to remove unwanted moles from gardens. The company kept records indicating that the population of weights of moles in its region was approximately normal with a mean of 150 grams and a standard deviation of 56 grams. The European Union announced that starting in 1995, only moles weighing between 68 grams and 211 grams can be legally caught. Molegon wanted to know what percentage of all moles could be legally caught. Calculate an answer.
 - a. First find the probability that a mole weighs less than 68 grams.
 - b. Next find the probability that a mole weighs less than 211 grams.
 - c. Now you are ready to find the probability that a mole weighs between 68 and 211 grams.

"Hints" for calculating normal probabilities.

1. When given the observation, always calculate a z score.
 - a. Then use the table to find the probability you are less than the observation. (This is just finding the number inside the table.)
 - b. To find the probability you are greater than the observation just take $1 -$ probability that you are less than the observation.

2. If you want to find the probability that you are between two values:
 - a. Find the probabilities that you are less than both values (you will be finding two z scores and 2 corresponding probabilities.)
 - b. Then subtract the two probabilities. (larger $-$ smaller)

3. When you are given the percentile and then asked to find the observation:
 - a. First use the inside of the table to find the closest proportion (ex. $90^{\text{th}} \sim .9000$ or $27^{\text{th}} \sim .2700$.)
 - b. Then write down the z score from the table.
 - c. Plug the z score into the formula and solve for x.