Normal Random Variables

STAT-UB.0103 – Statistics for Business Control and Regression Models

Standard normal random variables

1. Suppose Z is a standard normal random variable. What is $P(Z \leq 1.2)$?

2. Suppose Z is a standard normal random variable. What is $P(Z \leq -2.36)$?

3. Suppose Z is a standard normal random variable. What is $P(Z \leq -0.41)$

4. Suppose Z is a standard normal random variable. What is $P(-0.41 \leq Z \leq 1.2)$?

5. Suppose Z is a standard normal random variable. What is $P(Z > 1.96)$?

Normal CDF

6. The dressed weights of Excelsior Chickens are approximately normally distributed with mean 3.20 pounds and standard deviation 0.40 pound. About what proportion of the chickens have dressed weights greater than 3.60 pounds?

7. Suppose that an automobile muffler is designed so that its lifetime (in months) is approximately normally distributed with mean 26 months and standard deviation 4 months.
   (a) The manufacturer has decided to use a marketing strategy in which the muffler is covered by warranty for 18 months. Approximately what proportion of the mufflers will fail before the warranty expires?

   (b) Suppose that the manufacturer in the previous example would like to extend the warranty time to 24 months. Approximately what proportion of the mufflers will fail before the extended warranty expires?

   (c) Of all the mufflers that fail under the extended warranty, what proportion of them have failures in the interval $(18 \text{ months}, 24 \text{ months})$?

Inverse Normal CDF

8. Suppose that Z is a standard normal random variable. Find the value w so that $\mathrm{P}(|Z| \leq w) = 0.60$.

9. A machine that dispenses corn flakes into packages provides amounts that are approximately normally distributed with mean weight 20 ounces and standard deviation 0.6 ounce. Suppose that the weights and measures law under which you must operate allows you to have only 5% of your packages under the weight stated on the package. What weight should you print on the package?

More examples

10. Suppose that the daily demand for change (meaning coins) in a particular store is approximately normally distributed with mean \$800.00 and standard deviation \$60.00.

    (a) What is the probability that, on any particular day, the demand for change will be below \$600?

    (b) Find the amount M of change to keep on hand if one wishes, with certainty 99%, to have enough change. That is, find M so that $\mathrm{P}(X \leq M) = 0.99$.