

Drill Problems III

WITH BRIEF ANSWERS

PROBLEM 1: *Fuel mileage*

The average distance that a truck can travel with a single gallon of gasoline is 20 miles. The standard deviation of distance for a single gallon is 2 miles.

(a) Suppose that the distance traveled with a single gallon of fuel is normally distributed. What is the probability that with a single gallon of fuel, the truck will travel 21.5 miles or less?

(b) Suppose the truck is filled with 50 gallons of fuel. What is the probability that the truck can travel more than 1010 miles with that fuel? (Assume distance traveled is independent for each gallon of fuel consumed.)

Answer:

(a) $\text{NORMDIST}(21.5,20,2,\text{true}) = 77.3\%$

(b) By the CLT, $100\% - \text{NORMDIST}(1010,20 * 50,2 * \text{sqrt}(50),\text{true}) = 24\%$

PROBLEM 2: *Recruiting*

The average age of entry level employees at fast food restaurants is 21.4 with a standard deviation of 3.7.

(a) Does this give us enough information to calculate the probability that such a person is younger than 21.0 years old?

(b) Assume that each job applicant's age is independent at a restaurant with 40 such employees. Do we have enough information to calculate the probability that the *average* age of those employees is 21.0 or less? If so, calculate it.

Answer:

(a) No. For instance, we do not know that the age of an individual is normally distributed.

(b) Yes, the CLT allows us to use $\text{NORMDIST}(21.0,21.0,3.7/\text{sqrt}(40),\text{true}) = 24.7\%$.