

Sample questions:

1. A certain brand of thermometer is tested by checking the temperature at which water boils at 1 atmospheric pressure. Assume $\mu = 100.0^\circ\text{C}$ and $\sigma = 1.0^\circ\text{C}$ and the values are normally distributed.

- (a) Find the probability of randomly selecting one thermometer that reads between 98.5°C and 101.5°C .

0.866

- (b) Find the probability of randomly selecting one thermometer that reads greater than 101.5°C .

0.0668

- (c) Find the probability of randomly selecting one thermometer that reads between 101.0°C and 102.0°C .

0.136

- (d) Find the probability of randomly selecting one thermometer that reads exactly 100°C .

0

2. For a study of a particular pollutant, a researcher wishes to select specimens in the middle 60% of the population based on the concentration of the pollutant. If the mean concentration is 120ppm and the standard deviation is 8ppm, find the upper and lower values of this range. [Hint: Let z_0 be the z-score such that $P(-z_0 < z < z_0) = 0.60$. Find z_0 and translate the result to concentrations.]

 $113.28 < x < 126.72$ ppm

3. The mean pH value of a certain acid solution used in a chemical plant is 3.0. The standard deviation is 0.5. If a lab technician administers the pH test to 22 specimens of this acid solution taken from the production line at different times, find the probability that the mean of the sample will be between 2.7 and 3.1.

 $P(2.7 < \bar{x} < 3.1) = 0.8235$

4. The average cholesterol content of certain brand of eggs is 215 milligrams, and the standard deviation is 15 milligrams. Assume the variable is normally distributed.
 - a) If a single egg is selected, find the probability that the cholesterol content will be greater than 220 milligrams,
 - b) If a sample of 25 eggs is selected, find the probability that the mean of the sample will be larger than 220 milligrams.

 $P(\bar{x} > 220) = 0.0475$