1. Let $X$ be a uniformly distributed between 10 and 15.
   (a) Determine the cumulative distribution function for $X$, or $F(x)$
   (b) Find the mean of $X$
   (c) Find the variance of $X$
   (d) Determine $x$ such that $P(X > x) = 0.30$

2. Assume the $Z$ has a standard normal distribution. Use your $Z$-table from Montgomery, or the $Z$-tables in your graphing calculator to determine the following:
   (a) $P(Z < 3)$
   (b) $P(Z > 2.22)$
   (c) $P(-1 < Z < 1)$
   (d) $P(0 < Z < 2.5)$

3. Assume the $Z$ has a standard normal distribution. Use your $Z$-table from Montgomery, or the $Z$-tables in your graphing calculator to determine the value $z$ that solve each of the following:
   (a) $P(-z < Z < z) = 0.95$
   (b) $P(-z < Z < z) = 0.99$
   (c) $P(-z < Z < z) = 0.85$

4. The time until recharge for a battery in a laptop computer under common conditions is normally distributed with a mean of 260 minutes and a standard deviation of 50 minutes.
   (a) What is the probability that a battery lasts more than five hours?
   (b) What is the 1st quartile of battery life?
      Note: the 1st quartile is the time with 0.25 probability below it.
   (c) What is the 3rd quartile of battery life?
      Note: the 3rd quartile is the time with 0.75 probability below it.

5. Cholesterol is a fatty substance that is an important part of the outer lining (membrane) of cells in the body. Its normal range for an adult is 120-240 mg/dl. The Food and Nutrition Institute of the Philippines found that the total cholesterol level for Filipino Adults has a mean of 159.2 mg/dl and 84.1% of adults have a cholesterol level less than 200 mg/dl. Suppose that the total cholesterol level is normally distributed. Determine the standard deviation of this distribution.

More on back...
6. In an accelerator center, the thickness of a cylinder has a normal distribution with a mean of 1.41 cm and a standard deviation of 0.01 cm.

(a) What is the probability that a thickness is greater than 1.42 cm?
(b) What thickness is exceeded by 95% of the samples?
(c) If the specifications require that the thickness is between 1.39 cm and 1.43 cm, what proportion of the samples meets specifications?

7. Suppose that the log-ons to a computer network follow a Poisson process with an average of three log-ons per minute.

(a) What is the mean time between log-ons?
(b) What standard deviation of time between log-ons?
(c) Determine \( x \) such that the probability that at least one log-on occurs before time \( x \) minutes is 0.95

8. Suppose the number of insect fragments in a chocolate bar follows a Poisson process with the expected number of fragments in a 225-gram chocolate bar being 14.4.

(a) What is the expected number of insect fragments in 1/4 of a 225-gram chocolate bar?
(b) What is the probability that you have to eat more than 10 grams of chocolate bar before finding your first fragment?
(c) What is the expected number of grams to be eaten before encountering the first fragment?
(d) What is the probability of eating a 1/4 of a 225-gram chocolate bar and eating no fragments?
(e) Suppose you consume seven one-ounce (28.35-gram) bars this week. What is the probability of no insect fragments?

9. The time between calls to a corporate office is exponentially distributed with a mean of 10 minutes.

(a) What is the probability that there are more than 3 calls in one-half hour?
(b) What is the probability that there are no calls within one-half hour?
(c) Determine \( x \) such that the probability that there are no calls within \( x \) hours is 0.01.
(d) What is the probability that there are no calls within a two-hour interval?
(e) If four non-overlapping one-half-hour intervals are selected, what is the probability that none of these intervals contains any call?

10. The distance between major cracks in a highway follows an exponential distribution with a mean (or expected value) of 5 miles.

(a) What is \( \lambda \)? (What is the rate parameter. Note that you’re given an expected value.)
(b) What is the probability that there are no major cracks in a 10-mile stretch of highway?
(c) What is the probability that the first major crack occurs between 12 and 15 miles of the inspection start point?
(d) What is the probability of finding 7 cracks in a 5-mile stretch of highway?