5.1.6 Suppose that $X \sim N(\mu, \sigma^2)$ and that

$$P(X \leq 10) = 0.55 \quad \text{and} \quad P(X \leq 0) = 0.40$$

What are the values of μ and σ^2?

5.1.8 What are the upper and lower quartiles of a $N(0, 1)$ distribution? What is the interquartile range? What is the interquartile range of a $N(\mu, \sigma^2)$ distribution?

5.1.16 Bricks have weights that are independently distributed with a normal distribution that has a mean 1320 and a standard deviation of 15. A set of ten bricks is chosen at random. What is the probability that exactly three bricks will weigh less than 1300, exactly four bricks will weigh between 1300 and 1330, and exactly three bricks will weigh more than 1330?

5.2.12 Five students are waiting to talk to the TA when office hours begin. The TA talks to the students one at a time, starting with the first student and ending with the fifth student, with no breaks between students. Suppose that the time taken by the TA to talk to a student has a normal distribution with a mean of 8 minutes and a standard deviation of 2 minutes, and suppose that the times taken by the students are independent of each other.

(a) What is the probability that the total time taken by the TA to talk to all five students is longer than 45 minutes?

(b) Suppose that the time that elapses between when the TA starts talking to the first student, and when the TA starts to have a headache, has a normal distribution with a mean of 28 minutes and a standard deviation of 5 minutes, which is independent of the times taken to talk to the students. What is the probability that the TA's headache starts at a time after the TA has finished talking to the third student?

5.2.14 The times taken for worker 1 to perform a task are independently distributed as as normal distribution with mean 13 minutes and standard deviation 0.5 minutes. The times taken for worker 2 to perform a task are independently distributed as a normal distribution with mean 17 minutes and standard deviation 0.6 minutes, and they are independent of the times taken by worker 1. At the beginning of the day, both workers start their first task at the same time, and when they have finished a task, they immediately start another task. What is the probability that worker 1 will finish his fourth task before worker 2 has finished his third task?

5.3.2 Calculate the following probabilities both exactly and by using a normal approximation:

(a) $P(X \geq 7)$ where $X \sim B(10, 0.3)$

(b) $P(9 \leq X \leq 12)$ where $X \sim B(21, 0.5)$

(c) $P(X \leq 3)$ where $X \sim B(7, 0.2)$

(d) $P(9 \leq X \leq 11)$ where $X \sim B(12, 0.65)$

5.3.6 In a test for a particular illness, a *false-positive* result is obtained about 1 in 125 times the test is administered. If the test is administered to 15,000 people, estimate the probability of there being more than 135 false-positive results.

5.3.14 The time to failure of an electrical component has a Weibull distribution with parameters $\lambda = 0.056$ and $a = 2.5$. A random collection of 500 components is obtained. Estimate the probability that at least 125 of the 500 components will have failure times larger than 20.