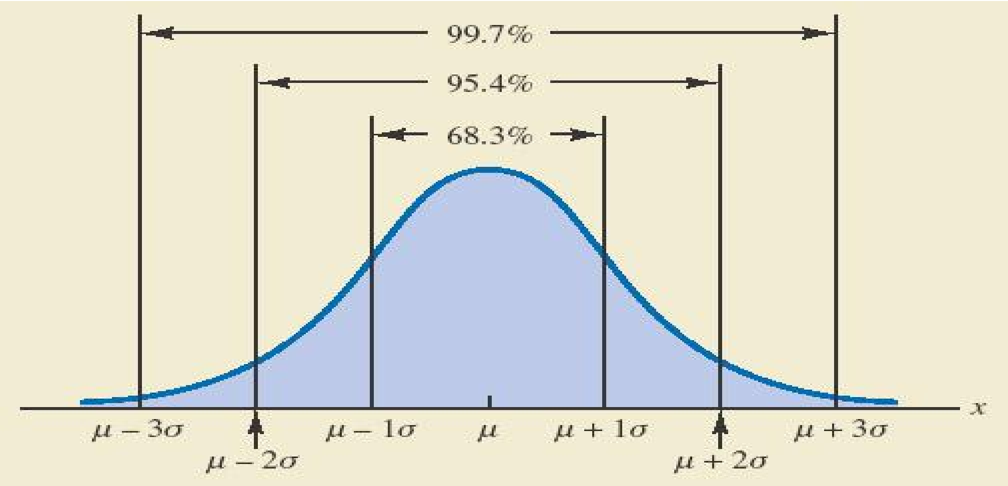
Chapter 6 Problems and Solutions - Continuous Probability Distributions

1. The random variable x is known to be uniformly distributed between 1.0 and 1.5.
   a. Show the graph of the probability density function.
   b. Compute $P(x = 1.25)$.
   c. Compute $P(1.0 < x < 1.25)$.
   d. Compute $P(1.20 < x < 1.5)$.

2. The random variable x is known to be uniformly distributed between 10 and 20. a. Show the graph of the probability density function.
b. Compute $P(x < 15)$.
c. Compute $P(12 < x < 18)$.
d. Compute $E(x)$.
e. Compute $\text{Var}(x)$.

8. Using Figure 6.4 as a guide, sketch a normal curve for a random variable x that has a mean of $\mu = 100$ and a standard deviation of $\sigma = 10$. Label the horizontal axis with values of 70, 80, 90, 100, 110, 120, and 130.



12. Given that z is a standard normal random variable, compute the following probabilities.

a. $P(0 < z < .83)$
b. $P(-1.57 < z < 0)$
c. $P(z > .44)$

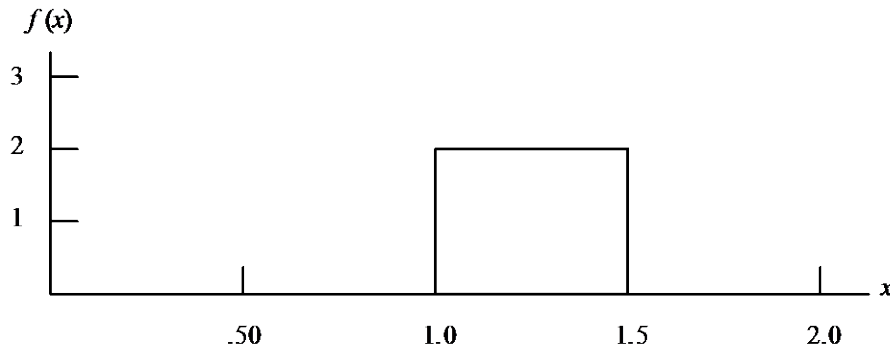
13. Given that z is a standard normal random variable, compute the following probabilities.

a. $P(-1.98 < z < .49)$
b. $P(.52 < z < 1.22)$
c. $P(-1.75 < z < -1.04)$

15. Given that z is a standard normal random variable, find z for each situation.
a. The area to the left of z is .2119.
b. The area between $-z$ and z is .9030.
c. The area between $-z$ and z is .2052.
d. The area to the left of z is .9948.
e. The area to the right of z is .6915.

Chapter 6 Solutions

1. a.

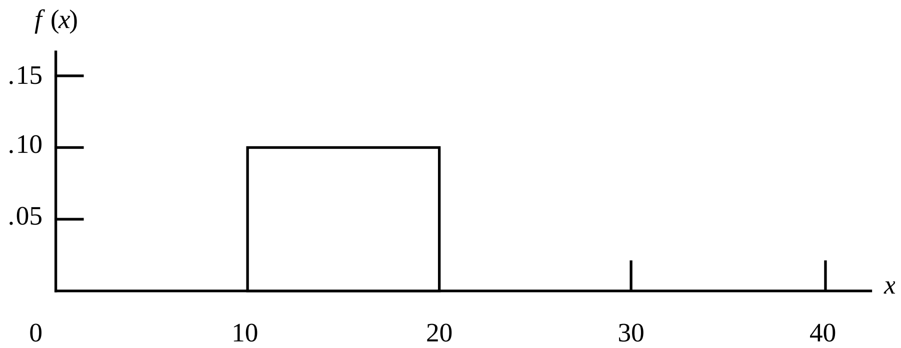


b. $P(x = 1.25) = 0$. The probability of any single point is zero since the area under the curve above any single point is zero.

c. $P(1.0 \leq x \leq 1.25) = 2(.25) = .50$

d. $P(1.20 < x < 1.5) = 2(.30) = .60$

2. a.



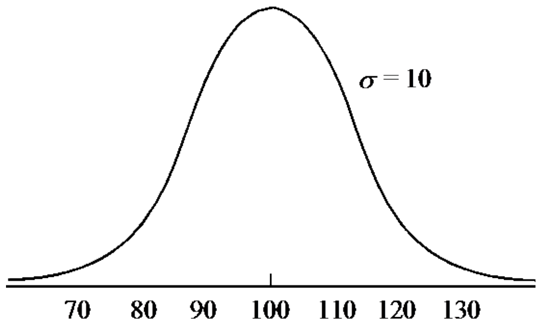
b. $P(x < 15) = .10(5) = .50$

c. $P(12 \leq x \leq 18) = .10(6) = .60$

d. $E(x) = \frac{10+20}{2} = 15$

e. $\text{Var}(x) = \frac{(20-10)^2}{12} = 8.33$

8.



12. a. $P(0 \le z \le .83) = .7967 - .5000 = .2967$

b. $P(-1.57 \le z \le 0) = .5000 - .0582 = .4418$

c. $P(z > .44) = 1 - .6700 = .3300$

d. $P(z \ge -.23) = 1 - .4090 = .5910$

e. $P(z < 1.20) = .8849$

f. $P(z \le -.71) = .2389$

13. a. $P(-1.98 \le z \le .49) = P(z \le .49) - P(z < -1.98) = .6879 - .0239 = .6640$

b. $P(.52 \le z \le 1.22) = P(z \le 1.22) - P(z < .52) = .8888 - .6985 = .1903$

c. $P(-1.75 \le z \le -1.04) = P(z \le -1.04) - P(z < -1.75) = .1492 - .0401 = .1091$

15. a. The z value corresponding to a cumulative probability of .2119 is $z = -.80$.

b. Compute .9030/2 = .4515; z corresponds to a cumulative probability of .5000 + .4515 = .9515. So $z = 1.66$.

c. Compute .2052/2 = .1026; z corresponds to a cumulative probability of .5000 + .1026 = .6026. So $z = .26$.

d. The z value corresponding to a cumulative probability of .9948 is $z = 2.56$.

e. The area to the left of z is 1 - .6915 = .3085. So $z = -.50$.