- 4.5

  (a) $k = 1/\int_0^2 x^2 dx$

  (b) $\int_0^1 f(x)dx$

  (c) $\int_1^{1.5} f(x)dx$

  (d) $\int_{1.5}^2 f(x)dx$

- 4.15

(d) The 75th percentile is the value of x for which $F(x) = .75 \Longrightarrow 0.75 = 10x^9 - 9x^{10}$.

- 4.33 X = diameter of a randomly selected tree. $X \sim N(8.8, 2.8)$

  (d)

$$\begin{aligned} 0.98 &= P(8.8 - c < X < 8.8 + c) \\ &= P(-\frac{c}{2.8} < Z < \frac{c}{2.8}) \\ &= 1 - 2\Phi(-c/2.8) \\ \Longrightarrow & -c/2.8 = -2.33 \end{aligned}$$

  (e) From (a), $P(X > 10) = .3336$. Define event A as {diameter > 10}, then P(at least one A_i) = 1-P(no A_i)= $1-P(X < 10)^4$.

- 4.42

  (a) 0.7938

  (b) 5.88. Similar to 4.33(c).

  (c) 7.94. Y = number of acceptable specimens among the ten. Y is a binomial r.v. with $n = 10$ and $p = .7938$, and $E(Y) = np$.

  (d) Y = the number among the 10 specimens with hardness less than 73.84. $Y \sim Bino(10, p)$ where $p = .8997$. So $P(Y \leq 8) = .264$.

- 4.44 Check your answer by using the full table.

- 4.51 $N = 500, p = 0.4, \mu = 200, \sigma = 10.9545$

  (a) $P(180 \leq X \leq 230) = P(179.5 \leq \text{normal} \leq 230.5) = P(-1.87 \leq Z \leq 2.78)$

  (b) $P(X < 175) = P(X \leq 174) = P(\text{ normal} \leq 174.5) = P(Z \leq -2.33)$

- 4.60

  (a) 0.75, 0.9375, 0.1875

  (b) $1 - P(-2/\lambda < X - 1/\lambda < 2/\lambda) = P(X > 3/\lambda) = 0.05$

  (c) Solve equation $0.5 = 1 - e^{-\lambda x}$ to obtain $x = 50.01$.

- 4.63

  (b)

$$\begin{aligned}
F(t) &= 1 - P(X > t) \\
&= 1 - \Pi_{i=1}^{5} P(A_i) \\
&= 1 - e^{-5\lambda t} \\
f(t) &= \frac{dF(t)}{dt} = 5\lambda e^{-5\lambda t}
\end{aligned}$$

- 4.117

  (a)

$$\begin{aligned}
F(x) &= P(X \leq x) \\
&= P(-(1/\lambda)\ln(1-U) \leq x) \\
&= P(U \leq 1 - e^{-\lambda x}) \\
&= 1 - e^{-\lambda x}
\end{aligned}$$

  (b) By taking successive random numbers $u_1, u_2, ...$ and computing $x_i = -\frac{1}{10}\ln(1-u_i), ...$ we obtain a sequence of values generated from an exponential distribution with parameter $\lambda = 10$.