3.6
3.62

a) This statement is false. Consider the experiment consisting of a single role of a fair die. Our sample space is $\{1, 2, 3, 4, 5, 6\}$. Now consider the events $A = \{6\}$, $B = \{2, 4, 6\}$.

$P(A) = \frac{1}{6}$, $P(A|B) = \frac{1}{3}$ so A and B are dependent events, but $P(A \cap B) = \frac{1}{6}$ so the events are not mutually exclusive.

b) This statement is true. In our example let $C = \{1, 3, 5\}$. Events A and C are mutually exclusive and $P(A|C) = 0 \neq P(A)$. So, A and C are dependent events.

c) This statement is false. Suppose a die is rolled twice and $D = \{$a 6 is rolled on the 1st toss$\}$ and $E = \{$a 6 is rolled on the 2nd toss$\}$. $P(A \cap B) = \frac{1}{36}$ and $P(B|A) = \frac{1}{6} = P(B)$.

3.6
3.74

a) Probability the adult owns at least one gun is 0.26. At $\frac{720}{2770}$

b) Given the adult owns a gun the probability it is a revolver is 0.20. $\neq \frac{144}{720}$

c) The probability that the adult owns a gun and it is a handgun is $0.26(0.05) = 0.013$.

ON ASSIGN # 4

ON ASSIGN #4

3.6 / 3.84

a) The probability a man never smoked cigars and died from cancer is $\frac{782}{137243} \approx 0.006$.

b) The probability a man was a former cigar smoker and died from cancer $= \frac{91}{137243} \approx 0.0007$

c) The probability a man was a current cigar smoker and died from cancer $= \frac{141}{137243} \approx 0.001$

d) Given that the man never smoked cigars, the probability he died from cancer is $\frac{141}{7866} \approx 0.018$

e) Given that the man never smoked cigars, the probability he died from cancer is $\frac{782}{121529} = 0.006$

4.1 / 4.8

The annual rainfall is continuous.
The number of species is discrete.

4.2 / 4.10

a) This is a valid distribution because $\sum p(x) = 1$ and $p(x) \geq 0$ for all x.

b) This is not a valid distribution because $\sum p(x) \neq 1$.

c) This is not a valid distribution because $p(4) < 0$.

d) This is not a valid distribution because $\sum p(x) > 1$.

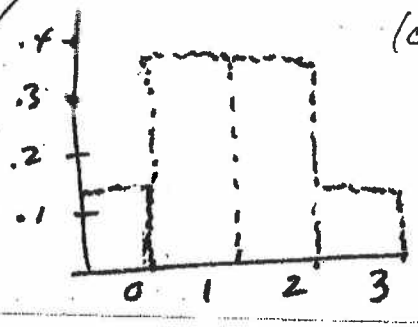
4.2
4.20

Sample Points	x	p(x)
TTT	0	1/8
TTH	1	1/8
THT	1	1/8
HTT	1	1/8
THH	2	1/8
HTH	2	1/8
HHT	2	1/8
HHH	3	1/8

(a)

x	p(x)
0	1/8 ≈ 0.125
1	3/8 ≈ 0.375
2	3/8 ≈ 0.375
3	1/8 ≈ 0.125

(b)



(c)

$P(x=2 \text{ or } x=3) = \frac{4}{8} = 0.5$

(d)

4.2
4.24

(a)

x	p(x)
2	0.0408
3	0.1735
4	0.6020
5	0.1837

(b) $P(x=5) = 0.1837$

(c) $P(x \leq 2) = 0.0408$

(d) $E(x) = \mu = 3.9286$

The average star rating for all cars is 3.9286.

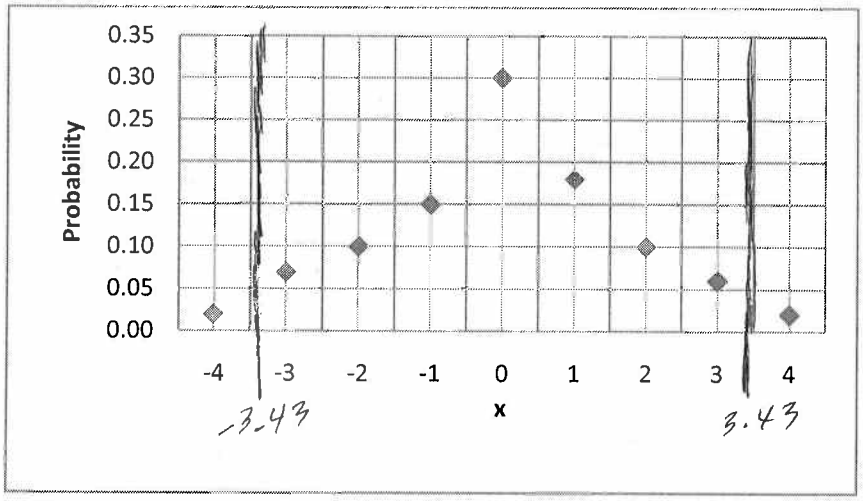
Exercise 4.22

(a)

x	P(x)	xP(x)	$(x - \mu)^2$	$(x - \mu)^2 P(x)$
-4	0.02	-0.08	16.00	0.32
-3	0.07	-0.21	9.00	0.63
-2	0.10	-0.20	4.00	0.40
-1	0.15	-0.15	1.00	0.15
0	0.30	0.00	0.00	0.00
1	0.18	0.18	1.00	0.18
2	0.10	0.20	4.00	0.40
3	0.06	0.18	9.00	0.54
4	0.02	0.08	16.00	0.32

μ =	0.00	($\mu = \Sigma x P(x)$)
σ^2 =	2.94	($\sigma^2 = \Sigma(x - \mu)^2 P(x)$)
σ =	1.715	($\sigma = \text{sqrt}(\sigma^2)$)

(b)



(c) $P(-3.43 < x < 3.43) = 1 - P(x = -4) - P(x = 4)$
$= 1 . 0.02 - 0.02$
$= 0.96$

So the probability that x will fall within two standard deviations of the mean is about 0.96

Exercise 4.24

(a)

x	P(x)	xP(x)
2	0.0408	0.0816
3	0.1735	0.5205
4	0.6020	2.4080
5	0.1837	0.9185

(b) $P(x = 5) = 0.1837$

(c) $P(x \leq 2) = P(x = 2) = 0.0408$

(d) $\mu = E(x) = \Sigma xP(x) =$ 3.9286

The mean star rating for all 98 cars is 3.9286. (Almost 4.)

Exercise 4.32

x	≈ P(x)	xP(x)
6,999,999	0.00000003	0.21874997
-1	0.999999969	-0.99999997

$\mu = E(x) = \Sigma xP(x) =$ -0.78125000

On avarage each ticket purchased represents about a 78 cent loss.