2.34

a) For the probability model, refer to the attached excel sheet. The expected winnings would be $4 when we sum the fourth row. The standard deviation of the winnings would come out as 5.4 after we sum the 7^{th} row and take the square root of the sum.

b) The maximum amount is computed as follows:

number of red cards in the deck = 26
number of spades in the deck = 13
number of clubs in the deck = 13
number of ace of clubs in the deck = 1

amount won for a red card = $0
amount won for a spade = $5
amount won for a club = $10
amount won for ace of clubs = $10 + $20 = $30

Total = 26*($0) + 13*($5) + 12*($10) + $30 = $215

The maximum amount is dependent on the total number of cards in each suit and the amount won for each card that is drawn.

2.40

a) For the probability model, refer to the attached excel sheet. The average revenue per passenger would be $16. The standard deviation would approximately be 20.

b) The expected revenue is computed as the product of the number of passengers and the average revenue per passenger.

Expected revenue = 120*($16) = $1,920

Each passenger is an independent variable. Therefore, we would have 120 independent variables. The coefficient for each variable is 1. The variance for each passenger would be $398.10 as previously computed.

Variance = ((1^2) + (1^2) + --- + (1^2) +(1^2))*(398.10) = $47,772

Standard deviation = sqrt(Variance) = $218.57

2.42

a) $110 - $38 = $72 = profit needed

variance = ((1)^2)$16 + ((-1)^2)$25 = $41

standard deviation = 6.4

b) 0.1*$110 = $11
$11 - $110 = -$99

variance = $9,801

standard deviation = $99

2.46

a) The distribution is not normal. In this distribution, the majority of the population has an income that is between $35,000 and $49,999.

b) The probability is computed as follows

P(income < $50,000) = 2.2% + 4.7% + 15.8% +18.3% +21.2% = 62.2%

c) Both variables are independent of each other. The probability of selecting a female is 0.41. As previously computed, the probability of selecting someone with an income below $50,000 is 0.622. In order to obtain the probability of selecting a female who earns below $50,000 we would have to multiply the two probabilities.

P(A and B) = P(A)*P(B) = 0.622*0.41 = 0.25502

0.25502*(96,420,486) = 24,589,152

percentage of females earning below $50,000 =
24,589,152/(0.41*96,420,486) = 62%

d) total number of females in the sample = 0.41*(96,420,486) = 39,532,399

total number of females earning below $50,000 = 0.718*(39,532,399) =
28,384,263

The answer obtained in part c was off by approximately 4 million. Therefore the assumption made in part c was not correct. Gender and income cannot be variables that are independent of each other.