probability

q.1

a.

the probability for not identical twins = $\frac{1}{125}$

the probability for identical twins = $\frac{1}{300}$

the probability for having a boy = $\frac{1}{2}$

the probability that Elvis had an identical twine =

$$\frac{\frac{1}{300}\times\frac{1}{2}}{\frac{1}{125}}=\mathbf{\frac{5}{24}}$$

b.

the probability for each bowl = $\frac{1}{2}$

the probability to choose chocolate cookie in bowl 1 = $\frac{30}{40}\times\frac{1}{2}=\frac{3}{8}$

the probability to choose chocolate cookie in bowl 2 = $\frac{20}{40}\times\frac{1}{2}=\frac{1}{4}$

the probability to choose chocolate cookie = $\frac{3}{8}+\frac{1}{4}=\frac{5}{8}$

the probability to choose chocolate cookie from bowl 1 = $\frac{\frac{1}{2}\times\frac{3}{4}}{\frac{5}{8}}=\mathbf{\frac{3}{5}}$

q.2

the probability for each bag = $\frac{1}{2}$

the probability to choose yellow from 1994 = $\frac{20}{100}\times\frac{1}{2}=\frac{1}{10}$

the probability to choose green from 1994 = $\frac{10}{100}\times\frac{1}{2}=\frac{1}{20}$

the probability to choose yellow from 1996 = $\frac{14}{100}\times\frac{1}{2}=\frac{7}{100}$

the probability to choose green from 1996 = $\frac{20}{100}\times\frac{1}{2}=\frac{1}{10}$

the probability to choose yellow = $\frac{1}{10}+\frac{7}{100}=\frac{17}{100}$

the probability to choose green = $\frac{1}{20}+\frac{1}{10}=\frac{3}{20}$

the probability that a yellow candy came from 1994 = $\frac{\frac{1}{10}}{\frac{17}{100}}\times\frac{\frac{1}{10}}{\frac{3}{20}}=\mathbf{\frac{20}{51}}$

q.3

a. The probability to be sick = $\frac{1}{10,000}$

The probability for false positive= $\frac{1}{100}$

The probability to tested positive when you are sick= $\frac{1}{100} \times \left(1 - \frac{1}{10000}\right) + \frac{1}{10000} \times 1$

$= 0.009999 + 0.0001$

$= 0.010099$

The probability to be sick when tested positive=$\frac{\frac{1}{10000}}{0.010099} \approx 0.0099$

b. P(sick)=$\frac{1}{200}$

P(positive test)= $\frac{1}{100} \times \left(1 - \frac{1}{200}\right) + \frac{1}{200} \times 1 = 0.01495$

The probability to be sick when tested positive=$\frac{\frac{1}{200}}{0.01495} \approx 0.3344$

q.4

P(get a number divided by 3)= $\frac{12}{36} = \frac{1}{3}$

P(get a number not divided by 3)= $1 - \frac{1}{3} = \frac{2}{3}$

His expected value from the game is: $6 \times \frac{1}{3} - 3 \times \frac{2}{3} = 0\$$

q.5

P(get more then 12)=$\frac{6}{25}$

P(get 12)=$\frac{4}{25}$

P(get more then 12)=$\frac{15}{25} = \frac{3}{5}$

His expected value from the game is: $5 \times \frac{6}{25} + 0 \times \frac{4}{25} - 6 \times \frac{3}{5} = -2.4\$$

q.6

num of employees selected= 8

probability for male=0.4

mean=$0.4 \times 8 = 3.2$

Standard Deviation= $\sqrt{0.4 \times 0.6 \times 8} = 1.385$

q.7

P(26<X<30)=0.4772

q.8

$\frac{2\times0.4}{2}=0.4$

q.9

P(3 of the employees have children)=$4\times\left(\frac{300}{500}\times\frac{299}{499}\times\frac{298}{498}\times\frac{200}{497}\right)=0.346$

q.10

0.1*(-10)+0.35*(-5)+0.1*(0)+0.35*(-5)+0.1*(10)=0