QUESTION 1 a :

Identical twins - $\frac{1}{125}$

Unidentical twins - $\frac{1}{300}$

Probability of twins - $\frac{1}{125} + \frac{1}{300} = \frac{17}{1500}$

(identical twins/ given twins) = $(\frac{1}{300} / \frac{17}{1500})$

$$P(A\backslash B) = \frac{P(B\backslash A)\cdot P(A)}{P(B)} = \frac{1\cdot\frac{1}{300}}{\frac{17}{1500}} = \frac{5}{17}\cdot\frac{1}{2} = \frac{5}{34}$$

($\frac{1}{2}$ *is the pribability of a male twin*).

QUESTION 1 b:

1 bowl - $\frac{3}{4}$ *chocolate cookies*

1 bowl - $\frac{1}{4}$ *Almond cookies*

2 bowl - $\frac{1}{2}$ *chocolate cookies*

2 bowl - $\frac{1}{2}$ *Almond cookies*

Probability of first bowl - $\frac{1}{2}$

Probability By given that the chosen cookie is chocolate - $\frac{3}{4}\cdot\frac{1}{2} = \frac{3}{8}$

Probability of chocolate cookies of all bowls - $\frac{3}{4} + \frac{1}{2} = \frac{5}{8}$

$$P(A\backslash B) = \frac{P(B\backslash A)\cdot P(A)}{P(B)} = \frac{\frac{3}{5}\cdot\frac{1}{2}}{\frac{5}{8}} = \frac{12}{25} = 0.48$$

QUESTION 2:

1994 yellow – 0.2

1994 green – 0.1

1996 yellow – 0.14

1996 green – 0.2

Given – $0.2 \cdot 0.14 + 0.1 \cdot 0.2 = 0.048$

We need to double by 0.5 for the probability of which bag was it chosen:

$0.048 \cdot 0.5 = 0.024 = \frac{3}{125}$

QUESTION 3 a:

Incidence : $\frac{1}{10{,}000}$

Positive test and sick – 0.99

Positive test and healthy – 0.1

$p(positive\ test \backslash sick) \cdot p(sick) + (positive\ test \backslash healthy) \cdot p(healthy)$ = 0.010099

QUESTION 3 b:

$sick\ probability = \frac{1}{200}$

$probability\ of\ sick\ by\ positive\ test = 1$

$p(sick \backslash positive\ test) = \frac{p(positive\ test \backslash sick) \cdot p(sick)}{p(positive\ test)}$

$1 \cdot \frac{1}{200} + 0.01 \cdot \frac{199}{200} = 0.01495$

RANDOM VARIABLES:

QUESTION 1:

The probability to get a number that divided by 3 : $\frac{12}{36} = \frac{1}{3}$

The probability to get a number that divided by 3 : $1 - \frac{12}{36} = \frac{2}{3}$

$$\left(\frac{1}{3}\right) \cdot 6 + \left(\frac{1}{2}\right) \cdot (-3) = 0$$

QUESTION 2:

Bag 1 – 5 red (1-5)

Bag 2 – 5 green (6-10)

Probability of loosing 6$: $\frac{15}{25}$

Probability of even : $\frac{4}{25}$

Probability of wining 5$: $\frac{6}{25}$

$$\frac{6}{25} \cdot 5 + \frac{4}{25} \cdot 0 + \frac{15}{25} \cdot (-6) = -\frac{12}{5}$$

QUESTION 3:

Men – 80

Women – 120

mean =

$$probability\ to\ get\ male \cdot how\ many\ employees\ are\ selected\ each\ month$$

$0.4 \cdot 8 = 3.2 = \frac{16}{5}$

Formula for standard division : $\sqrt{\frac{p(1-p)}{n}}$

(population) p = 0.4 (40% male)

Sample size : n = 8 (8 employees every month)

$$\sqrt{\frac{0.4(1-0.4)}{8}} = 0.1732 \approx 0.2$$

QUESTION 4:

Mean = 26,000

Standard division = 2,000

68% = 1 standard division from mean

95% = 2 standard division from mean

99.7% = 3 standard division from mean

P(26,000 < X < 28,000) = 68% = 0.68

P(28,000 < X < 30,000) = 95% = 0.95

Mean = $\frac{(0.68+0.95)}{2} = 0.815$

QUESTION 5:

We will calculate the area of the tringle from 3 < X < 5 by taking 0.4 as the height :

$$\frac{(0.4 \cdot 2)}{2} = 0.4$$

QUESTION 6:

Employees – 500

Employees that have children – 60% = 300 employees

$$\frac{200}{500} \cdot \frac{300}{500} \cdot \frac{299}{500} \cdot \frac{298}{500} = 0.08553$$

QUESTION 7:

$$(-10) \cdot 0. + (-5) \cdot 0.35 + 0 \cdot 0.1 + 5 \cdot 0.35 + 10 \cdot 0.1 = 0$$