15.39(q)

Adam, Barb

Adam, Charlie

Adam Doris

Barb, Charlie

Barb, Doris

Charlie, Doris

There are in total six different possible pairs, each pair can either be a pair of friends or a pair of enemies.

Compute above, we get $2^6 = 64$

Answer: 1/64

16.4

(a)

In world 1, all ravens are black.

In world 2, there is a white raven.

If you pick world 1, all ravens are black. Pick word 2, not all ravens are black.

Compute above, we get $\frac{1}{2}$ for the answer

(b)

Probability of all ravens are black, given that you see a black raven in your world.

P[A|B] = P[All ravens are black | you see a black raven]

$$P[A|B] = \frac{A \cap B}{B} = \frac{\frac{100}{1000000}}{\frac{1100}{1000000}} = \mathbf{\frac{1}{11}}$$

16.37

(a)

Fair coins: $\frac{1}{4}$

Unfair: 1

$$\frac{5}{100}+\frac{95}{400}=\frac{115}{400}=\mathbf{\frac{23}{80}}$$

(b)

Fair coins: $\frac{1}{4}$

Unfair: 0

$$\frac{95}{100}*\frac{1}{4}=\frac{95}{400}=\mathbf{\frac{19}{80}}$$

(c)

Unfair: 1

Fair coins: $\frac{1}{2}$

{tail, head}, **{tail, tail}**, {head, tail}, **{head, head}**

$$\frac{5}{100}+\frac{95}{100}*\frac{1}{2}=\frac{105}{200}=\mathbf{\frac{21}{40}}$$

16.40

(a)

$$P[both\ are\ girls|one\ is\ a\ girl] = \frac{1}{4} \div \frac{1}{2} = \frac{1}{2}$$

(b)

Assume the probability of a girl named Leiltton is p

There are four possibly combinations of boys and girls:

BB: do not need to consider

BG: 1. A Boy, A girl named Leilitoon 0.25p

BG: 1. A Boy, A girl named Leilitoon 0.25p

GG 1. A girl named Leiltoon, A girl but not Leiltoon 0.25 * p(1-p)

2. A girl named Leiltoon, A girl but not Leiltoon 0.25 * p(1-p)

3. A girl but not Leiltoon, A girl but not Leiltoon 0.25 * $(1-p)^2$

4. A girl named Leiltoon, A girl named Leiltoon 0.25 * p^2

P[GG | Leilitoon] =$\frac{0.25p^2+0.5*p(1-p)}{0.25p+0.25p+\frac{1}{4}*p(1-p)*2+0.25p^2}$

P =$\frac{2-p}{4-p}$.

Since P is a girl name Leiltton and Leiltton is a rare name, we can assume that p is close to zero. In this case, $P = \frac{2-p}{4-p}$ is close to $\frac{1}{2}$

(c)

The chance for a girl to born on Sunday is $\frac{1}{7}$, plug $p = \frac{1}{7}$ back into the equation we get above, we get $P = \frac{2-p}{4-p} = \frac{13}{27}$

17.9

(a)

independent

If B is a black square, no white square is taken, doesn't affect A

(b)

dependent

From given, B is at even column, and it could be at an even row or an odd row. If it is at an even row, a possible spot for A is taken, it will affect the chance of A.

(c)

dependent

From given, B is at even column, and it could be at a black square or a white square. If it is at a white square row, a possible spot for A is taken, it will affect the chance of A.

17.28

P = 1 – probability of no matches for 5 throws

probability of no matches for 5 throws = $\left(\frac{99}{100}\right)^4 * \left(\frac{98}{99}\right)^3 * \left(\frac{97}{98}\right)^2 * \left(\frac{96}{97}\right)^1 * \left(\frac{95}{96}\right)^0 = 0.9035$

P = 1 -$0.9035 = 0.00965$