**Homework 1**

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**Problem 1**

(a) Let  denotes the event that none has high blood lead level in a randomly selected group of 16 children.

Then 

(b) Let denotes the event that one child has high blood lead level in a randomly selected group of 16 children.

Then 

(c) Let denotes the event that two children have high blood lead level in a randomly selected group of 16 children.

Then 

(d) Let denotes the event that three or more have high blood lead level in a randomly selected group of 16 children.

Then 

**Problem 2**

Let  denotes the height of corn plants, then 

(a) 

Because and ,



(b) According to central limit theory, .

Thus,  for a random sample of 16 plants.



Because and ,



(c) According to central limit theory, .

Thus,  for a random sample of 32 plants.





**Problem 3**

Let denotes the event that individuals preferred to use right hand to write.

Let denotes the event that individuals preferred to use right foot to kick a ball.

Then 



Since , hand and foot preferences are not independent.

**Exercise 2.1**

Let G denotes a child is a girl.

Let B denotes a child is a boy.

Let A denotes that at least one child is boy.

Then we have 

(a) The question actually asks what is .

Using Bayes rule, we have



(b) Let b denotes the event that I happen to see one of his children and it is a boy.

The question actually asks what is .

Using Bayes rule, we have



**Exercise 2.2**

Let denotes the event that one has the crime blood type.

Let denotes the event that one is guilty.

Both prosecutor and defender want to infer  given some evidence.

Using Bayes rule, we have



(a) The prosecutor only has the evidence that  and nothing else.

Thus, there is no way for us to infer ,and .

So simply using  to represent  is wrong.

(b) The defender has the evidence that  and 

Thus,



Strictly speaking, the defender was right until the last statement “ thus has no relevance”.

The posterior probability is 100 times as large as the priori probability , thus it is not convincing to say one has no relevance just depending on  is a small number.

**Exercise 2.4**

Let  denotes the event that one has this disease.

Let  denotes the event that the test is positive.

Then we have  and .

We want to infer .

Using Bayes rule,



**Exercise 2.5**

Let  denotes the event that the prize was behind door 1.

Let  denotes the event that the prize was behind door 2.

Let **** denotes the event that the prize was behind door 3.

Let  denotes the event that I choose door 1 and the host open door 3.

Then we have , ,  and .

Thus,





So, it is better to switch to door 2.

**Exercise 2.12**



Similarly,

