Wednesday, January 17

Today’s Readings

Class

- Mathematics of Casinos
- Cultural Critique: Lottery and Casino Issues
- Film: *Lola Rennt (Run Lola Run)*

For Thursday

Reading

- Polkinghorne, *Introduction and Providence*
- Haarsema, *Chance from a Theistic Perspective*
- Haarsema and Haarsema, *Is the Creator Infinitely Lazy?*

Problems

Do problems 16 – 17.

Get Some Extra Sleep

Since the film will go a bit long today, we will start class at 9am tomorrow. Enjoy your extra half hour of sleep.
Some Problems

16. We said in class that the margin of error depends on the sample size. This problem investigates this statement in more detail.

   a) Recall that the margin of error also depends on the sample proportion ($\hat{p}$). The worst case (i.e. largest margin of error) occurs when the proportion is 0.5, so assume that situation and work out the margin of error for each of the sample sizes below.

<table>
<thead>
<tr>
<th>sample size ($n$)</th>
<th>margin of error</th>
</tr>
</thead>
<tbody>
<tr>
<td>sample prop. = 0.5</td>
<td>sample prop. = 0.3</td>
</tr>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td></td>
</tr>
<tr>
<td>6400</td>
<td></td>
</tr>
</tbody>
</table>

   b) Now fill out the columns in your chart for the margin of error assuming a sample proportion of 0.3 and 0.1.

   c) What do you notice when you look at the completed table?

17. Suppose a disease affects 0.1% of some population (that’s 1 person per 1000). Also suppose that there is a blood test for this disease that is correct 95% of the time. This means that if you have the disease, then the test comes back positive 95% of the time, and if you don’t have the disease, the test comes back negative 95% of the time.

   We want to determine the probability that a randomly selected individual has the disease, given that the test result comes back positive. (A positive test result indicates is evidence for disease.) Let’s use $H$ and $D$ to represent the events that the person is healthy or diseased, and we’ll use $+$ and $-$ to represent a positive or negative test result.

   a) Start by filling in the table below. In the upper left box we want to put $P(D \text{ and } +)$, which is the probability that our randomly selected individual is diseased and tests positive. Recalling that

   $$P(D \text{ and } +) = P(D) \cdot P(+|D)$$

   we can work out this probability. Do so and put it in the upper left cell of the table.

   
   
   
   
   
   +   |
   +---+---|
   D   |
   |
   |
   |
   |
   -   |
   |
   |
   |

   b) Use similar reasoning to fill in the other three cells of the table. Show your work in the space below.

   c) Now answer the original question: What is the probability that a randomly selected individual has the disease, given that the test result comes back positive?

   Express this quantity using the notation we learned in class and compute its value.
Final Exam Information

The exam will be given at 9am on Tuesday, January 30. It will include a variety of sections including:

1. A multiple choice section (25 items) covering the readings from Plantinga’s book. This section will be written by Lee Hardy, the DCM coordinator and used in all sections of DCM. You should have a handout from him (from the first day of class) giving more details about this.

2. The exam may include additional multiple choice items that I write. If so, these will be similar to the ones you have had on quizzes.

3. There will be a number of short answer questions. Sometimes I provide several questions and give some freedom to choose what you write about.

   In short answer questions I am looking for a couple sentences to a paragraph (depending on the item) with the following characteristics: correctness, conciseness, focus, clarity, importance, etc. In short I am looking for high quality. If I ask for an example of something, choose an especially clear example. If I ask for a reason, choose an important reason.

4. One of the items on the exam will have the following instructions:

   Pick (some number) of the following terms or phrases and

   • identify the author or speaker who used it and the context in which it was used. (By context, I mean what the author was talking about and the point that was being made.)

   • explain what is meant by the term or phrase as it was used by that author. (One to three sentences will probably suffice for this.)

   (A list of terms and phrases will follow for you to select from.)

   These items do not require lengthy answers, but the do require careful and thoughtful answers. The exam will include a list of all the titles and authors, so you don’t have to memorize them, only recognize them.

5. There will be some problems covering probability and statistics. These will be similar to the kinds of problems you have had for homework.

6. On Friday you will be given instructions about a take-home essay. The essay will be due on Tuesday, January 30, at 3pm and should be 1000-1500 words in length.
Study Guides

In preparation for the final, each of you will prepare a study guide for one or more of the readings we have done (from the list below). You may work in pairs.

Your study guide must be typed. Choose a structure that is appropriate for your reading. Typically this will include some sort of outline of the reading(s) and also highlight key words and phrases. For those of you doing a section of Plantinga’s book, be sure to consult with the information sheet I handed out on the first day to see what sorts of things will be included on the multiple choice part of the final exam. Also consult the information regarding the final exam as you prepare your study guide.

These are due by **Friday at 5pm**. You must give me a hard copy (in class on Friday or to the box outside my office Friday afternoon) and also submit an electronic copy (as a Word doc or pdf file) to KnightVision. Instructions on how to submit to KnightVision will be forthcoming. By posting things to KnightVision, we can make them available for the entire class to use (if they want to) in preparing for the final exam.

Since you are going back over material at the end of the course, you may wish to include connections between your assigned readings and other readings. (Does your author agree or disagree with other authors? Was the topic addressed elsewhere? etc.) Also, be sure to include page references where appropriate so that it is easy of others to find things in the originals.

1. Plantinga, Preface & Appendix II
2. Plantinga, Chapters 1–2
3. Plantinga, Chapters 3–4
4. Plantinga, Chapter 5, Epilogue & Appendix III (pp. 191–197)
5. Atkins, *The Limitless Power of Science*
6. Gould, *Non-Overlapping Magisteria*
7. Fang Li Zhi, *Note on the Interface Between Science and Religion*
8. MacKay, *A Scientist in God’s World*
9. MacKay, Chapters II and III.4–6
13. Clapp, *Why the Devil Takes VISA*