

ASSIGNMENT 9

due Wednesday, November 28

Instructions

By Monday, November 19:

- Read the biography of Kant on page 749 of Kahn.
- From Kant's *Critique of Pure Reason*, read:
 - Sections I and II of the introduction to the second edition, on pages 764-765.
 - Sections IV, V, and VI, from page 767 until the end of page 770.
 - Sections I and II of Part I of the *Transcendental Doctrine of Elements*, on pages 774-776.

Enjoy Thanksgiving break. There is no class on Wednesday, November 21 or Friday, November 23.

By Monday, November 26:

- Finish reading Chapter 9 of TTT.

By Wednesday, November 28:

- Read Chapter 11 in TTT, through page 287.

Turn in the homework assignment at the beginning of class on Wednesday, November 28.

Homework assignment

1. I draw a marble from an urn with 200 red marbles and 300 blue marbles; and then replace it, and repeat the process four more times. What are the odds that in the end I will have chosen a red marble exactly three times?
2. TTT, study question 2 on page 204.
3. A factory has two machines making widgets. The newer machine, machine A, makes 800 widgets a day, while the older machine, machine B, makes 200 widgets a day. Among the widgets made by the new machine, 1% are defective; among the widgets made by the old machine, 2% are defective. At the end of the day, I randomly pick a widget from the day's production.
 - a) Assuming each widget is equally likely to be chosen, what is the probability that the widget came from machine A? What is the probability that the widget did not come from machine A?
 - b) What is the probability that the widget is defective, given that it was made by machine A? What is the probability that the widget is defective, given that it was not made by machine A?
 - c) What is the probability that the widget is defective?
 - d) Now, suppose someone tells you that the widget is defective. Use Bayes' theorem to calculate the probability that it came from machine A.
4. TTT, review question 12 on page 218. (M)

5. Explain Kant's argument, in the *Critique*, that mathematical judgements are synthetic. (Use examples and quotes from the reading.) (M)
6. In Section I of the *Critique of Pure Reason*, Kant writes: "But even though all our cognition starts **with** experience, that does not mean that all of it arises **from** experience." What does he mean by this? Explain. (M)

Thought questions

1. A card is drawn at random from a deck of 52. What is the probability that the card is
 - a) not a spade?
 - b) either a heart or a diamond?
 - c) a face card (Jack, Queen, or King) but not a spade?

Make up similar problems, involving cards, dice, or roulette wheels, and then solve them.
2. Suppose a probability space X has three outcomes, a , b , and c . Suppose also that $P(\{a,b\}) = 1/2$ and $P(\{b,c\}) = 2/3$. Determine $P(\{a\})$, $P(\{b\})$, and $P(\{c\})$.
3. Suppose P is a probability measure on X , and A and B are events with $P(A) = 1/3$ and $P(\sim B) = 1/4$ (where $\sim B$ is the complement of B). Can A and B be incompatible events?
4. I flip a coin 10 times. For each number n between 1 and 10, use Pascal's triangle to compute the probability that the coin comes up heads exactly n times.
5. State Bernoulli's theorem, and explain how it can be used to address Hume's problem of induction.
6. The study question on page 200 of TTT.
7. I roll a fair die 3 times. What is the probability that I get three sixes? What is the probability I get at least one six?
8. TTT, study questions 1 and 2 on page 204.
9. TTT, the study question on page 210.
10. TTT, the study question on page 214.
11. TTT, review questions 3, 5-9, and 11 on page 218.
12. TTT, review questions 1-7 on pages 244-245.