Hemophilia: The Royal Disease

1. What is the probability that her other son was hemophilic?

2. What is the probability that her daughter was a carrier? Hemophilic?

3. What is the probability that both children were normal?

4. Looking at the pedigree of the royal family, identify which of Beatrice’s children received the hemophilic gene; why can you make this conclusion?

5. Notice that Beatrice’s daughter, Eugenie, married king Alfonso XIII of Spain and had six children, one of whom was father of Juan Carlos, the current king of Spain. Would you predict that Juan Carlos was normal, a carrier, or a hemophilic?

6. What are the probabilities that all four of the girls were carriers of the allele hemophilia?

7. Supposing Alexis had lived and married a normal woman, what are the chances that his daughter would be a hemophiliac?

8. What are the chances his daughters would be carriers?

9. What are the chances that his sons would be hemophiliacs?
10. According to Eugene’s argument, what was the likely hemophiliac status of Eugene’s mother and grandmother? What about his father and grandfather? Is this argument plausible?

11. How plausible is it that Eugene inherited both hemophilia and the last name from the royal family? (Hint: Look how each of them is passed from generation to generation.)