

Name: _____
Date: _____

Business Data Analysis
201-316-VA

In Class Exercise # 10: Rules of probability

1. Say What?

In 1993, the Barbie Liberation Organization swapped the voice boxes out of 400 talking G.I. Joe dolls, with those of talking Barbies, and then returned them to stores. Unsuspecting kids who bought the toys heard Barbie say “Vengeance is mine!” and G.I. Joe say, “I love shopping!”¹

At a toy store, there are 20 Barbie and 30 G.I. Joe dolls on the shelves. Fifteen of the Barbies and 18 of the Joe dolls have had their voice boxes switched out.

- (a) If one G.I Joe doll and one Barbie doll are selected at random, what is the probability both had their voice boxes switched out?

- (b) If one G.I Joe doll and one Barbie doll are selected at random, what is the probability neither had their voice boxes switched out?

- (c) If one G.I Joe doll and one Barbie doll are selected at random, what is the probability at least one of them had their voice boxes switched out?

- (d) If three Joe dolls were purchased by three different clients, what is the probability all three have had their voice boxes switched out?

2. 1914 Christmas Truce

In the early months of World War I, an unofficial ceasefire was declared along the Western Front. In the weeks leading up to Christmas, German and British soldiers took the opportunity to exchange gifts and play soccer with each other. On the German side, troops put up a sign which read “Gott mit uns” (“God with us”). In response, the British put up a cheeky sign which said “We’ve got mittens, too”².

At a local store, 85% of the mittens are made in Germany while the rest are made in England. Suppose that 4% of the British mittens have an imperfection in them, while the same could be said about 6% of the German ones. What is the probability that a randomly selected pair of mittens

- (a) has an imperfection?

- (b) is free of imperfections and German made?

¹https://en.wikipedia.org/wiki/Barbie_Liberation_Organization

²<http://www.ppu.org.uk/remembrance/xmas.html>

(c) was British made if it had an imperfection?

(d) was German made if it had no imperfections?

3. **The Shaggy Defense**

The Shaggy defense is a legal strategy in which the defendant flatly denies guilt even though there is overwhelming evidence against them - particularly in the form of a video recording³. The hallmarks of the defense involves a refusal to engage with the evidence and strenuous denial that it was them who committed the act. The term is derived from Shaggy's 2000 single "It Wasn't Me" in which the song describes a man asking a friend what to do after his girlfriend catches him cheating on her. The friend's advice was to simply deny that it was him.

Lawyer, Saul Goodman, uses the Shaggy defense in 30% of the cases that he is assigned to. The rest of the time, he uses the Chewbacca defense⁴. Whenever he uses the Shaggy defense, it results in a not guilty verdict 40% of the time, and a guilty verdict the rest of the time. If he were to use the Chewbacca defense, then the probability of getting a not guilty verdict for his client is 80% and a guilty verdict the rest of the time.

(a) What proportion of Saul's cases end in a not guilty verdict?

(b) If a client was found guilty, what is the probability that he used the Shaggy defense?

(c) If a client was found to be not guilty, what is the probability that the Chewbacca defense was used?

(d) If a case from Saul were to be randomly selected, what is the probability that he used the Shaggy defense or got a not guilty verdict for his client?

³https://en.wikipedia.org/wiki/Shaggy_defense

⁴See page 69