

EXAM P QUESTIONS OF THE WEEK

S. Broverman, 2006

Week of June 12/06

In the 2006 World Cup of soccer, according to an online ranking service, Brazil, England and Germany are the three most highly ranked teams to win the tournament. A survey of soccer fans asks the fans to rank from most likely to least likely the chance of each those country's teams winning the world cup. The survey found that 50% of the fans ranked Brazil first., 30% ranked Brazil second, 30% ranked England second, 50% ranked England third, and 20% ranked Brazil first and England second. Of the fans surveyed who ranked England first, find the proportion who ranked Brazil last.

The solution can be found below.

Week of June 12/06 - Solution

There are 6 possible rankings that a surveyed fan can choose:

BEG , BGE , EBG , EGB , GEB , GBE

We are given the following:

$$P(BEG) + P(BGE) = .5 , P(EBG) + P(GBE) = .3 , P(BEG) + P(GEB) = .3 , \\ P(BGE) + P(GBE) = .5 , P(BEG) = .2 .$$

$$\text{We wish to find } P(EGB|EGB \cup EBG) = \frac{P(EGB)}{P(EGB)+P(EBG)} .$$

Since 80% ranked England either second or third, it follows that 20% ranked England first, so

$$P(EGB \cup EBG) = P(EGB) + P(EBG) = .2 .$$

From the given information, we have $.2 + P(BGE) = .5 \rightarrow P(BGE) = .3$.

Then, $.3 + P(GBE) = .5 \rightarrow P(GBE) = .2$.

Then, $P(EBG) + .2 = .3 \rightarrow P(EBG) = .1$, and then $P(EGB) + .1 = .2 \rightarrow P(EGB) = .1$.

$$\text{Finally, } \frac{P(EGB)}{P(EGB)+P(EBG)} = \frac{.1}{.1+.1} = \frac{1}{2} .$$