EXAM P QUESTIONS OF THE WEEK

S. Broverman, 2006

Week of February 27/06

A study of the relationship between blood pressure and cholesterol level showed the following results for people who took part in the study:

(a) of those who had high blood pressure, 50% had a high cholesterol level, and

(b) of those who had high cholesterol level, 80% had high blood pressure.

Of those in the study who had at least one of the conditions of high blood pressure or high cholesterol level, what is the proportion who had both conditions?

The solution can be found below.

Week of February 27/06 - Solution

We will use B to denote the event that a randomly chosen person in the study has high blood pressure, and C will denote the event high cholesterol level.

The information given tells us that $P(C|B) = .50$ and $P(B|C) = .80$.

We wish to find $P(B \cap C | B \cup C)$.

This is

$$\frac{P[(B\cap C)\cap(B\cup C)]}{P(B\cup C)} = \frac{P[B\cap C)]}{P(B)+P(C)-P(B\cap C)} = \frac{1}{\frac{P(B)+P(C)-P(B\cap C)}{P(B\cap C)}} = \frac{1}{[\frac{1}{P(C|B)}+\frac{1}{P(C|B)}-1]}$$

$$= \frac{1}{\frac{1}{.5}+\frac{1}{.8}-1} = \frac{1}{2.25} = \frac{4}{9} .$$