

# Economics 257

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## Assignment 2

1. (This is a classic problem on which doctors are often said to do poorly, suggesting many mis-interpreted test results; however to be fair to them I think there may be semantic issues in that many understand a different meaning of the term ‘false positive’). A certain test for a genetic disorder has a false positive rate of 2%, meaning that in cases where the condition is absent, the test will falsely indicate that it is present 2% of the time. If an individual does have the disorder, the test correctly identifies this 99% of the time. The disorder occurs in 1 of every 1000 people. If someone gets a positive result, what is the probability that the individual has the disorder?

2. An equity analyst claims to be able to predict which of a set of stocks will gain the most in the coming year. He is given a list of eight stocks, and asked to predict, in order, the top three. What is the probability of getting the top three right, in order, by chance? (That is, assume that he in fact has no useful knowledge to bring to bear on this question, so that any stock is as likely as any other to get randomly picked for any place in his top three.)

Show two different ways to get this answer.

3. Obtain data from the web site of the Federal Reserve Bank of St. Louis, at <http://research.stlouisfed.org/fred2/data/>

on the following US variables:

$Y$  : real GDP, quarterly, seasonally adjusted;

$X$  : initial jobless claims, seasonally adjusted (SA) if available, otherwise unadjusted (NSA), available monthly, but convert to quarterly average either via web site or do it yourself from monthly data

$P$  : consumer price index (CPI – all items), available monthly, again convert to quarterly average either via web site or do it yourself from monthly data

In your assignment, indicate the day on which you downloaded the data, since the data sets may be updated.

- a. For each series  $Z$ , compute the quarterly percentage change  $(Z_t - Z_{t-1})/Z_{t-1} \times 100$ . Call these by the same variable name but lower case:  $y, x, p$ .
- b. Compute the correlation matrix (a  $3 \times 3$  matrix) of the percentage changes  $y, x, p$ . The correlation matrix has nine entries, but the three on the main diagonal are 1, and of the other 6, each is a repeat of another entry (the matrix is symmetric), and so there are only three numbers to calculate:  $\text{corr}(y, x)$ ,  $\text{corr}(y, p)$ , and  $\text{corr}(x, p)$ . Interpret these results briefly.
- c. Do the same for the the original variables  $Y, X, P$ .

- d. Interpret c. The result is actually nonsense: why? If you're not sure, try to download data on some clearly unrelated trending series such as cumulative quarterly rainfall in Tierra del Fuego, or the cumulative quarterly number of UFOs reported to NASA; compute correlations with  $Y$ ,  $X$ ,  $P$  and think about the result.
4. Newspaper subscribers are polled on whether they read the business section, and whether they invest in the stock market. The responses can be broken down as follows: invest and read bus. regularly, 20%; invest and read occasionally, 11%; invest and never read, 6%; don't invest and read regularly, 15%; don't invest and read occasionally, 26%; don't invest and never read it, 22%.
- Find the probability that a randomly-chosen subscriber never reads the business section.
  - Find the probability that a randomly chosen subscriber invests in stocks.
  - Find the probability that a subscriber who never reads the business section invests in stocks.
  - Find the probability that a subscriber who invests in stocks never reads the business section.
  - Find the probability that a subscriber who does not regularly read (that is, occasionally or never) the business section does invest in stocks.