Homework 7

1. Politics, Statistics, and Prostate Cancer

In a radio advertisement for the New Hampshire primary, GOP presidential candidate Rudy Giuliani cites his own experience with prostate cancer to warn against the dire consequences of government-provided health care, which he terms "socialized medicine". In the advertisement, he said:

"I had prostate cancer, five, six years ago**.** My chance of surviving prostate cancer, and thank God I was cured of it, in the United States: 82 percent. My chances of surviving prostate cancer in England: only 44 percent under socialized medicine".

Based on your knowledge on statistics relating to prostate cancer (incidence, mortality, and 5-year survival rate), comment on the accuracy of his statement. You might need to read news articles related to this topic.

2. Bioengineering and Breast Cancer

In class, we discussed 2 web resources relating to cancer sponsored by the American Cancer Society (cancer.org) and National Cancer Institute (cancer.gov). Use these websites to answer the following questions:

a. What is the estimated incidence and mortality of breast cancer in 2007 for men and women?

b. Read about the pathophysiology of the disease in women and men? What is the major similarity and difference between breast cancer in men and women based on their pathophysiology? Why do women have higher incidence of breast cancer compared to men?

c. What is the major risk factor for breast cancer in women?

d. Mammogram is a common screening technique for breast cancer in women? Briefly describe the technique. What are the current recommendations for breast cancer screening?

e. Describe these diagnostic techniques for breast cancer in women? Identify whether each diagnostic type is based upon either (a) morphological marker, (b) protein marker, or (c) DNA marker.

e.1. MRI.

e.2. HER-2 test.

e.3. BRCA test.

f. PET is a new/experimental technology for screening/diagnosis of breast cancer in women? Describe the technique and its current limitation.

3. Costs of cancer screening

An experimental screening test for breast cancer on 1,000 patients at a certain age group was found to have a sensitivity and specificity of 70%. The prevalance of the disease on the study is 1%. The cost of the screening test is $10 and follow-up biopsy is $1000.

a. How many false positive and false negative resulted from this study.

b. Calculate the cost per cancer for 1,000,000 people, assuming all positive tests are further diagnosed with biopsy examinations. Assume prevalence remain constant.

c. Calculate PPV and NPV values?

d. How high does specificity need to be to reach PPV value of 20%. Sensitivity and prevalence remain constant.