STA 4821 Exam (in class, open book) 30 Points 70 Minutes Spring 09

I pledge my honor that I have neither given nor received aid on this exam.

_____ _____

NAME SSN (last 4 digits)

Show all work (attach work pages). Write on one side of page only.
Write answers in space provided. Staple in upper left-hand corner.

Consider a symptomless viral infection, and suppose that a 2-stage diagnostic procedure for detecting this virus follows this protocol:
If a person tests negative with the initial (1st stage) diagnostic test, the person is declared Healthy.
If the initial test is positive, the person is tested again with a different diagnostic test; and if the second test is negative, the person is declared Healthy, but if the second test is also positive (two positive tests), then the person is declared Sick.

Suppose that the prevalence of this virus is 5/1000; and suppose that the initial test has false positive rate 0.03 and false negative rate 0.02, and the second test has false positive rate 0.01 and false negative rate 0.04.

Calculate your answers to 6 significant digits.

1. Find the probability that a person who tests positive on the first test is, in fact, Sick.

1) _____

2. Find the probability that a person who tests positive on the second test is, in fact, Sick.

2) _____

3. Find the accuracy of this 2-stage diagnostic procedure; that is, find the probability that this procedure will give the correct diagnosis.

3) _____