

**TIE4203 Decision Analysis in Industrial & Operations Management
Assignment #1**

Due: Friday 6 Sep 2024 (end of class)

You may use Excel or any software for your computations, but you must show your workings in the submission.

Submit your solutions at the drop box outside the ISEM Department Office at E1A-06-25 any time before the due date, or submit it to the lecturer/tutor at the end of class at LT52.

Total 25 marks

1. To evaluate the performance of a new diagnostic test, the developer performed a trial on 100 people known to have the disease and 90 of them have positive results. The test is also performed on 200 control cases known to be free of the disease and 30 of them have positive results. Based on these data, what is the sensitivity and specificity of the test?
(10 marks)

2. Based on all the information currently available, you estimate that Mr. Wong has a 0.25 probability of being infected by viruses M. You order a diagnostic test with sensitivity of 90% and specificity of 80% for detecting viruses M infections.
 - (a) Suppose that the result comes back positive. Based on all the information now available, what is the chance that Mr. Wong is infected by viruses M? (5 marks)

 - (b) On the other hand, suppose that the result comes back negative. Based on all the information now available, what is the chance that Mr. Wong is infected by viruses M? (5 marks)

3. A test with 90% sensitivity and 85% specificity is used to screen a population of 10,000 people for a disease with 2% prevalence rate. What is the expected number of people in the population that have test results that are correct? (5 marks)