# Question 1: Decision Analysis

The quality control manager in a chip manufacturing plant has to select one of two available quality control methods. The estimated error rates for the methods are presented below:

|  |  |  |
| --- | --- | --- |
| **Method** | **Type I Error Probability** | **Type II Error Probability** |
| **A** | .04 | .02 |
| **B** | .02 | .02 |

Type I error probability is defined as the conditional probability of rejecting a good lot. Type II error probability is defined as the conditional probability of accepting a poor quality lot.

Historical data suggests that *four* percent of the lots produced in the plant are of poor quality.

1. Based on the information specified above, what is the conditional probability that:
2. A lot rejected by using method A is actually good?
3. A lot accepted by using method A is actually bad?
4. A lot rejected by using method B is actually good?
5. A lot accepted by using method B is actually bad?
6. The organization incurs a cost of $4,000 when it rejects a good lot. It is further estimated that the cost of accepting a poor lot is $ 10,000 (due to liabilities). If the objective is to minimize the expected cost of errors, which quality control method should the manager adopt? Why?
7. For the current manufacturing process, the a-priori probability that a lot is poor is 0.04. Under what ranges of this probability should the manager to prefer method A? Assume that all other parameters remain as specified in (a) and (b).
8. Under what ranges for the cost of accepting a poor lot should the manager to prefer method A? Assume that all other parameters remain as specified in (a) and (b).