Problem

Children and adults with sore throats are often tested for strep throat. If untreated, strep throat can lead to rheumatic fever. The traditional method for assessing whether or not someone has strep throat is a culture. Because the results of the culture take a day to obtain, more rapid tests are often used. The Biostat A Optical Immunoassay (Strep A OLA), first developed in the early 1990s, as one of the rapid tests. Heiter and Bourbeau (1995) conducted a study in which the results of both the culture and Strep A OIA were obtained for 801 patients who potentially had strep throat. The results are in the following table:

<table>
<thead>
<tr>
<th>Test</th>
<th>Number of results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True Positive</td>
</tr>
<tr>
<td>Culture</td>
<td>239</td>
</tr>
<tr>
<td>Strep A OIA</td>
<td>225</td>
</tr>
</tbody>
</table>

Table 1. Culture vs. Strep OIA.

Answer the following questions based on the information given in the preceding table.

a) What is the sensitivity of the culture?

b) What is the specificity of the culture?

c) What is the predictive value of the culture?

Solution

Using the format of the data used in the book, for the culture we have the following values of the parameters (note the position of $d$ and $c$):

a) $a = 239$ - the number of true positives

b) $b = 7$ - the number of false positives

c) $d = 555$ - the number of true negatives

d) $c = 0$ - the number of false negatives

a) The sensitivity is $a/(a + c) = 239/(239 + 0) = 1$

b) The specificity is $d/(b + d) = 555/(555 + 7) = 0.9875$

c) The predictive value is $a/(a + b) = 239/(239 + 7) = 0.9715$