Statement of the Race Car Driver’s Decision Problem

Consider a race car driver who must decide between taking the long way around a race course or taking a short cut through the forest. If the driver takes the long way, the probabilities of finishing in first, second, or third place are .2, .2, and .6, respectively.

If the driver takes the short cut, then he faces the possibility that the bridge over the river will be washed out. Typically, the bridge is open 80% of the time and is washed out 20% of the time. There is a bridge advisory service located in the first part of the short cut. The service is good but not perfect. The reliability probabilities for the service are as follows:

<table>
<thead>
<tr>
<th>Reliability Probs.</th>
<th>service says ‘open’</th>
<th>service says ‘closed’</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(z/s)</td>
<td>(z1)</td>
<td>(z2)</td>
</tr>
<tr>
<td>bridge open (s1)</td>
<td>.9</td>
<td>.1</td>
</tr>
<tr>
<td>bridge washed out</td>
<td>.3</td>
<td>.7</td>
</tr>
</tbody>
</table>

The information service, of course, charges a fee of $f.

If the driver turns back at the information service, then the driver will (definitely) finish in second place. If the driver continues from the service and the bridge is washed out, then the driver must turn back and will (definitely) finish in third place. If the driver continues on from the service and the bridge is open, then the driver has even odds of finishing in first or second place.

The prizes are as follows; $100,000 for first place, $50,000 for second place, and $10,000 for third place. Suppose the driver is risk neutral and is concerned only with change in wealth (as represented by the prizes).

PROBLEM:
Find the (maximum) value of the fee $f for which the driver will use the information service (i.e., buy the information).

The map is below.
Map for the Race Car Driver problem

- finish line
- bridge
- short cut
- long way
- information booth
- you are here