3. Sleepy Head Incorporated claims the citizens of Westville spend $105 on pillows a year. Outraged citizens claim the average is lower than $105. Suppose, in a random sample of 39 Westville citizens, the sample average spent on pillows is $104 and the sample standard deviation is $3.50. Test at 1%.

(a) [1] Circle all the true (correct) statements.

(i) This test asks which of one of two possible choices for the statistic $\mu$ is correct.
(ii) This is a left-sided test.
(iii) The null hypothesis is $H_0 : \mu = 104$.
(iv) The sample of 39 Westville citizens need not be taken at random.
(v) The amount spent on pillows need not follow a normal distribution.

(b) [1] The observed value of the test statistic (which, remember, can be either standardized or not) is equal to (circle none, one or more) $-2.33$ / $-1.78$ / $103.7$ / $104$ / $105$.

(c) [1] The critical value is equal to (circle none, one or more) $-2.33$ / $-1.78$ / $103.7$ / $104$ / $105$.

(d) [1] Since the test statistic is larger than the critical value, we (circle one)

(i) disagree with the citizen’s claim that less than $105$, . . .
(ii) disagree with the citizen’s claim that about $105$, . . .
(iii) agree with the citizen’s claim that less than $105$, . . .
(iv) disagree with Sleepy Head’s assertion that less than $105$, . . .
(v) agree with Sleepy Head’s assertion that about $105$, . . .

. . . on average, is spent on pillows.

(e) [1] Match the two columns below.

<table>
<thead>
<tr>
<th>statistical terms</th>
<th>sleepy example</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) population</td>
<td>(i) Westville citizens</td>
</tr>
<tr>
<td>(ii) sample</td>
<td>(ii) yearly average spent on pillows by Westville citizens</td>
</tr>
<tr>
<td>(iii) statistic</td>
<td>(iii) amount spent on pillows by each of chosen 39</td>
</tr>
<tr>
<td>(iv) parameter</td>
<td>(iv) yearly average spent on pillows by chosen 39</td>
</tr>
<tr>
<td>(v) parameter</td>
<td>(v) 39 citizens</td>
</tr>
<tr>
<td>(vi) parameter</td>
<td>(vi) amount spent on pillows by each of the Westville citizens</td>
</tr>
</tbody>
</table>

 statistical terms | (i) | (ii) | (iii) | (iv) |
 sleepy example | | | | |
(a) (ii), (v)
(b) $-1.78, 104$
(c) $-2.33, 103.7$
(d) (i)
(e) (vi), (iii), (iv), (ii)