The Dutch herring scandals

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https://en.wikipedia.org/wiki/Soused_herring
https://sites.google.com/site/benvollaard/home
Questions (3)-(7). Are herring quality scores being rigged? The Dutch people love to eat herring and take its quality very seriously. A national board regularly samples and scores the quality of herring vendors. However, there have been concerns whether the ratings have been unduly favoring suppliers who are linked to a certain distributor. Professor Vollaard of Tilburg University investigated the matter by collecting the scores obtained by 293 vendors, 21 linked to the distributor, and 272 not linked. Assume that the population variances are approximately equal.

<table>
<thead>
<tr>
<th>Areas sampled</th>
<th>Mean score</th>
<th>Sample standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked</td>
<td>21</td>
<td>8.75</td>
</tr>
<tr>
<td>Not linked</td>
<td>272</td>
<td>5.71</td>
</tr>
</tbody>
</table>

The standard error of the difference between the two sample means is closest to:

A. 0.149
B. 0.386
C. 0.436
D. 0.660
E. None of the above is correct.

At 99% confidence, the decision rule is:

A. Reject \( H_0 \) if \( t > 2.575 \) or \( t < -2.575 \)
B. Reject \( H_0 \) if \( t > 2.316 \) or \( t < -2.316 \)
C. Reject \( H_0 \) if \( t > 2.617 \) or \( t < -2.617 \)
D. Reject \( H_0 \) if \( t > 2.325 \) or \( t < -2.325 \)
E. None of the above is correct.

The calculated test statistic is closest to:

A. -4.34
B. -2.13
C. 2.27
D. 4.60
E. 7.87

At 99% confidence, is there sufficient evidence to conclude that herring vendors linked to the distributor obtain higher test scores?

A. Yes, because the calculated test statistic is greater than the critical value.
B. No, because the calculated test statistic is less than the critical value.
C. Yes, because the calculated test statistic is less than the critical value.
D. No, because the calculated test statistic is greater than the critical value.
E. None of the above is correct.
Questions (3)-(7). Are herring quality scores being rigged? The Dutch people love to eat herring and take its quality very seriously. A national board regularly samples and scores the quality of herring vendors. However, there have been concerns whether the ratings have been unduly favoring suppliers who are linked to a certain distributor. Professor Vollaard of Tilburg University investigated the matter by collecting the scores obtained by 293 vendors, 21 linked to the distributor, and 272 not linked. Assume that the population variances are approximately equal.

<table>
<thead>
<tr>
<th>Areas sampled</th>
<th>Mean score (range: 1-10)</th>
<th>Sample standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked</td>
<td>21</td>
<td>8.75</td>
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<tr>
<td>Not linked</td>
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<td>5.71</td>
</tr>
</tbody>
</table>

(3) State the hypotheses to test whether there is a difference in the scores of vendors who are linked to the distributor and those who are not.

A. $H_0: \mu_{\text{Linked}} - \mu_{\text{Not}} \leq 0, H_a: \mu_{\text{Linked}} - \mu_{\text{Not}} > 0$

B. $H_0: \mu_{\text{Linked}} - \mu_{\text{Not}} \neq 0, H_a: \mu_{\text{Linked}} - \mu_{\text{Not}} = 0$

C. $H_0: \mu_{\text{Linked}} - \mu_{\text{Not}} \geq 0, H_a: \mu_{\text{Linked}} - \mu_{\text{Not}} < 0$

D. $H_0: \mu_{\text{Linked}} - \mu_{\text{Not}} = 0, H_a: \mu_{\text{Linked}} - \mu_{\text{Not}} \neq 0$

E. None of the above is correct.

(4) The standard error of the difference between the two sample means is closest to:

A. 0.149
B. 0.386
C. 0.436
D. 0.660
E. None of the above is correct.

(5) At 99% confidence, the decision rule is:

A. Reject $H_0$ if $z > 2.575$ or $z < -2.575$

B. Reject $H_0$ if $t > 2.316$ or $t < 2.316$

C. Reject $H_0$ if $t > 2.617$ or $t < -2.617$

D. Reject $H_0$ if $z > 2.325$ or $z < -2.325$

E. None of the above is correct.

(6) The calculated test statistic is closest to:

A. -4.34
B. -2.13
C. 2.27
D. 4.60
E. 7.87

(7) At 99% confidence, is there sufficient evidence to conclude that herring vendors linked to the distributor obtain higher test scores?

A. Yes, because the calculated test statistic is greater than the critical value.

B. No, because the calculated test statistic is less than the critical value.

C. Yes, because the calculated test statistic is less than the critical value.

D. No, because the calculated test statistic is greater than the critical value.

E. None of the above is correct.