Answer on Question #60348 – Math – Statistics and Probability

Question

•Determine the direction of the hypothesis test (one-sided left, one-sided right, bidirectional)
• Determine the test statistic (z* or t*) and the p-value for each of the following situations and
• Determine if they would cause the rejection of the null hypothesis if the confidence level was set at 95% in each case. (Hint: be wary of the sample size).

a) Ho: μ = 50 mL, Ha: μ ≠ 50 mL, sample mean = 48.1 mL, sample standard deviation = 5, n = 40;

b) Ho: μ ≤ 8.4 m3, Ha: μ > 8.4 m3, sample mean = 10 m3, s = 3.5, n = 25;

c) Ho: μ ≥ 20oC, Ha: μ < 20oC , sample mean = 17.1oC, s =4.6oC, n = 12;

d) Ho: μ = 380 s, Ha: μ ≠ 380 s, sample mean = 410 s, s = 75, n = 40;

e) Ho: μ ≤ 46 units, Ha: μ > 46 units, sample mean = 50 units, s = 9.5, n = 41.

Solution

a) Bidirectional test.

Test statistic: $z^* = \frac{48.1-50}{5/\sqrt{40}} = -2.40.$

Using NORM.S.DIST from Excel 2010 and higher obtain

p-value is $p = 0.016 < 0.05.$

Conclusion: reject the null hypothesis.

b) One sided right test

Test statistic: $t^* = \frac{10-8.4}{3.5/\sqrt{25}} = 2.29.$

Using T.DIST.RT from Excel 2010 and higher obtain

p-value is $p = 0.016 < 0.05$.

Conclusion: reject the null hypothesis.

c) One sided left test.

Test statistic: $t^* = \frac{17.1-20}{4.6/\sqrt{12}} = -2.18$.

Using T.DIST from Excel 2010 and higher obtain

p-value is $p = 0.026 < 0.05$.

Conclusion: reject the null hypothesis.

d) Bidirectional test.

Test statistic: $z^* = \frac{410-380}{75/\sqrt{40}} = 2.53$.

Using NORM.S.DIST from Excel 2010 and higher obtain

p-value is $p = 0.011 < 0.05$.

Conclusion: reject the null hypothesis.

e) One sided right test.

Test statistic: $z^* = \frac{50-46}{9.5/\sqrt{41}} = 2.70$.

Using NORM.S.DIST from Excel 2010 and higher obtain

p-value is $p = 0.004 < 0.05$.

Conclusion: reject the null hypothesis.