1. In a random sample of 20 active men, the average HDLc level was 48.9, and the standard deviation was 11.3. Test whether the average HDLc level for men in this population differs from 53 at the $\alpha = 0.05$ significance level, and find the $p$-value for the test.

2. A random sample of 15 Math SAT scores were obtained from a large university. The average score was 542 and the standard deviation was 117. Test whether the average Math SAT score at this university is greater than 500 at the $\alpha = 0.01$ significance level, and find the $p$-value for the test.

3. In a random sample of 12 women, the average blood glucose level was 97 mg/100 ml, and the standard deviation was 46 mg/100 ml. Test whether the average blood glucose level for women in this population is less than 120 mg/100 ml at the $\alpha = 0.1$ significance level, and find the $p$-value for the test.

4. In a random sample of 80 active men, the average HDLc level was 48.9, and the standard deviation was 11.3. Test whether the average HDLc level for men in this population differs from 53 at the $\alpha = 0.05$ significance level, and find the $p$-value for the test.

5. A random sample of 350 Math SAT scores were obtained from a large university. The average score was 542 and the standard deviation was 117. Test whether the average Math SAT score at this university is greater than 500 at the $\alpha = 0.01$ significance level, and find the $p$-value for the test.

6. In a random sample of 400 women, the average blood glucose level was 118 mg/100 ml, and the standard deviation was 46 mg/100 ml. Test whether the average blood glucose level for women in this population is less than 120 mg/100 ml at the $\alpha = 0.1$ significance level, and find the $p$-value for the test.
Answers

1. • The testing problem is
   \[ H_0 : \mu = 53 \text{ vs. } H_A : \mu \neq 53. \]
   • \[ T = -1.62, \] which is inside the range from \(-2.093\) to \(2.093\).
   • We do not reject \(H_0\) at the \(\alpha = 0.05\) significance level.
   • That is, we do not have strong evidence that the average HDLc level for men in this population differs from 53. (\(p\)-value = 0.122.)

2. • The testing problem is
   \[ H_0 : \mu = 500 \text{ vs. } H_A : \mu > 500. \]
   • \[ T = 1.39 \text{ which is not beyond } 2.624. \]
   • We do not reject \(H_0\) at the \(\alpha = 0.01\) significance level.
   • That is, we do not have strong evidence that the average Math SAT score at this university is greater than 500. (\(p\)-value = 0.0931.)

3. • The testing problem is
   \[ H_0 : \mu = 120 \text{ vs. } H_A : \mu < 120. \]
   • \[ T = -1.73, \text{ which is beyond } -1.363. \]
   • We reject \(H_0\) at the \(\alpha = 0.1\) significance level.
   • That is, we have strong evidence that the average blood glucose level for women in this population is less than 120 mg/100 ml. (\(p\)-value = 0.0558.)

4. • The testing problem is
   \[ H_0 : \mu = 53 \text{ vs. } H_A : \mu \neq 53. \]
   • \[ Z = -3.25, \text{ which is outside of the range from } -1.96 \text{ to } 1.96. \]
   • We reject \(H_0\) at the \(\alpha = 0.05\) significance level.
   • That is, we have strong evidence that the average HDLc level for men in this population differs from 53. (\(p\)-value = 0.00115.)

5. • The testing problem is
   \[ H_0 : \mu = 500 \text{ vs. } H_A : \mu > 500. \]
   • \[ Z = 6.72 \text{ which is beyond } 2.33. \]
   • We reject \(H_0\) at the \(\alpha = 0.01\) significance level.
   • That is, we have strong evidence that the average Math SAT score at this university is greater than 500. (\(p\)-value = \(9.14 \times 10^{-12}\).)

6. • The testing problem is
   \[ H_0 : \mu = 120 \text{ vs. } H_A : \mu < 120. \]
   • \[ Z = -0.870, \text{ which is not beyond } -1.28. \]
   • We do not reject \(H_0\) at the \(\alpha = 0.1\) significance level.
   • That is, we do not have strong evidence that the average blood glucose level for women in this population is less than 120 mg/100 ml. (\(p\)-value = 0.192.)