

## Hypothesis tests

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### MULTIPLE CHOICE

1. An assumption made about the value of a population parameter is called a
- hypothesis
  - conclusion
  - confidence
  - significance

ANS: A

PTS: 1

TOP: Hypothesis Tests

2. In hypothesis testing if the null hypothesis is rejected,
- no conclusions can be drawn from the test
  - the alternative hypothesis is true
  - the data must have been accumulated incorrectly
  - the sample size has been too small

ANS: B

PTS: 1

TOP: Hypothesis Tests

3. The average monthly rent for one-bedroom apartments in Chattanooga has been \$700. Because of the downturn in the real estate market, it is believed that there has been a decrease in the average rental. The correct hypotheses to be tested are
- $H_0: \mu \geq 700$        $H_a: \mu < 700$
  - $H_0: \mu = 700$        $H_a: \mu \neq 700$
  - $H_0: \mu > 700$        $H_a: \mu \leq 700$
  - $H_0: \mu < 700$        $H_a: \mu \geq 700$

ANS: A

PTS: 1

TOP: Hypothesis Tests

4. The average hourly wage of computer programmers with 2 years of experience has been \$21.80. Because of high demand for computer programmers, it is believed there has been a significant increase in the average wage of computer programmers. To test whether or not there has been an increase, the correct hypotheses to be tested are
- $H_0: \mu < 21.80$        $H_a: \mu \geq 21.80$
  - $H_0: \mu = 21.80$        $H_a: \mu \neq 21.80$
  - $H_0: \mu > 21.80$        $H_a: \mu \leq 21.80$
  - $H_0: \mu \leq 21.80$        $H_a: \mu > 21.80$

ANS: D

PTS: 1

TOP: Hypothesis Tests

5. In the past, 75% of the tourists who visited Chattanooga went to see Rock City. The management of Rock City recently undertook an extensive promotional campaign. They are interested in determining whether the promotional campaign actually **increased** the proportion of tourists visiting Rock City. The correct set of hypotheses is
- $H_0: P > 0.75$        $H_a: P \leq 0.75$
  - $H_0: P < 0.75$        $H_a: P \geq 0.75$
  - $H_0: P \geq 0.75$        $H_a: P < 0.75$
  - $H_0: P \leq 0.75$        $H_a: P > 0.75$

ANS: D

PTS: 1

TOP: Hypothesis Tests

6. A soft drink filling machine, when in perfect adjustment, fills the bottles with 12 ounces of soft drink. Any over filling or under filling results in the shutdown and readjustment of the machine. To determine whether or not the machine is properly adjusted, the correct set of hypotheses is
- $H_0: \mu < 12$     $H_a: \mu \leq 12$
  - $H_0: \mu \leq 12$     $H_a: \mu > 12$
  - $H_0: \mu \neq 12$     $H_a: \mu = 12$
  - $H_0: \mu = 12$     $H_a: \mu \neq 12$

ANS: D

PTS: 1

TOP: Hypothesis Tests

7. The manager of an automobile dealership is considering a new bonus plan in order to increase sales. Currently, the mean sales rate per salesperson is five automobiles per month. The correct set of hypotheses for testing the effect of the bonus plan is
- $H_0: \mu < 5$     $H_a: \mu \leq 5$
  - $H_0: \mu \leq 5$     $H_a: \mu > 5$
  - $H_0: \mu > 5$     $H_a: \mu \leq 5$
  - $H_0: \mu \geq 5$     $H_a: \mu < 5$

ANS: B

PTS: 1

TOP: Hypothesis Tests

8. A weatherman stated that the average temperature during July in Chattanooga is 80 degrees or less. A sample of 32 Julys is taken. The correct set of hypotheses is
- $H_0: \mu \geq 80$     $H_a: \mu < 80$
  - $H_0: \mu \leq 80$     $H_a: \mu > 80$
  - $H_0: \mu \neq 80$     $H_a: \mu = 80$
  - $H_0: \mu < 80$     $H_a: \mu > 80$

ANS: B

PTS: 1

TOP: Hypothesis Tests

9. The sum of the values of  $\alpha$  and  $\beta$
- always add up to 1.0
  - always add up to 0.5
  - is the probability of Type II error
  - None of these alternatives is correct.

ANS: D

PTS: 1

TOP: Hypothesis Tests

10. The probability of committing a Type I error when the null hypothesis is true is
- the confidence level
  - $\beta$
  - greater than 1
  - the Level of Significance

ANS: D

PTS: 1

TOP: Hypothesis Tests

11. The level of significance is the
- maximum allowable probability of Type II error
  - maximum allowable probability of Type I error
  - same as the confidence coefficient
  - same as the  $p$ -value

ANS: B

PTS: 1

TOP: Hypothesis Tests

12. The error of rejecting a true null hypothesis is
- a Type I error
  - a Type II error
  - is the same as  $\beta$
  - committed when not enough information is available

ANS: A                      PTS: 1                      TOP: Hypothesis Tests

13. The level of significance
- can be any positive value
  - can be any value
  - is (1 - confidence level)
  - can be any value between -1.96 to 1.96

ANS: C                      PTS: 1                      TOP: Hypothesis Tests

14. The probability of making a Type I error is denoted by
- $\alpha$
  - $\beta$
  - $1 - \alpha$
  - $1 - \beta$

ANS: A                      PTS: 1                      TOP: Hypothesis Tests

15. In the hypothesis testing procedure,  $\alpha$  is
- the level of significance
  - the critical value
  - the confidence level
  - 1 - level of significance

ANS: A                      PTS: 1                      TOP: Hypothesis Tests

16. If a hypothesis is rejected at the 5% level of significance, it
- will always be rejected at the 1% level
  - will always be accepted at the 1% level
  - will never be tested at the 1% level
  - may be rejected or not rejected at the 1% level

ANS: D                      PTS: 1                      TOP: Hypothesis Tests

17. If the probability of a Type I error ( $\alpha$ ) is 0.05, then the probability of a Type II error ( $\beta$ ) must be
- 0.05
  - 0.95
  - 0.025
  - None of these alternatives is correct.

ANS: D                      PTS: 1                      TOP: Hypothesis Tests

18. If a hypothesis is rejected at 95% confidence, it
- will always be accepted at 90% confidence
  - will always be rejected at 90% confidence
  - will sometimes be rejected at 90% confidence
  - None of these alternatives is correct.

ANS: B

PTS: 1

TOP: Hypothesis Tests

19. For a lower tail test, the  $p$ -value is the probability of obtaining a value for the test statistic
- at least as small as that provided by the sample
  - at least as large as that provided by the sample
  - at least as small as that provided by the population
  - at least as large as that provided by the population.

ANS: A

PTS: 1

TOP: Hypothesis Tests

20. The  $p$ -value
- is the same as the  $Z$  statistic
  - measures the number of standard deviations from the mean
  - is a distance
  - is a probability

ANS: D

PTS: 1

TOP: Hypothesis Tests

21. When the following hypotheses are being tested at a level of significance of  $\alpha$

$$H_0: \mu \geq 500$$

$$H_a: \mu < 500$$

the null hypothesis will be rejected if the  $p$ -value is

- $\leq \alpha$
- $> \alpha$
- $> \alpha/2$
- $\leq 1 - \alpha/2$

ANS: A

PTS: 1

TOP: Hypothesis Tests

22. In order to test the following hypotheses at an  $\alpha$  level of significance

$$H_0: \mu \leq 800$$

$$H_a: \mu > 800$$

the null hypothesis will be rejected if the test statistic  $Z$  is

- $\geq Z_\alpha$
- $< Z_\alpha$
- $< -Z_\alpha$
- $= \alpha$

ANS: A

PTS: 1

TOP: Hypothesis Tests

23. As the test statistic becomes larger, the  $p$ -value
- gets smaller
  - becomes larger
  - stays the same, since the sample size has not been changed
  - becomes negative

ANS: A                      PTS: 1                      TOP: Hypothesis Tests

24. For a lower bounds one-tailed test, the test statistic  $z$  is determined to be zero. The  $p$ -value for this test is
- zero
  - 0.5
  - +0.5
  - 1.00

ANS: C                      PTS: 1                      TOP: Hypothesis Tests

25. For a one-tailed test (lower tail) at 93.7% confidence,  $Z =$
- 1.86
  - 1.53
  - 1.96
  - 1.645

ANS: B                      PTS: 1                      TOP: Hypothesis Tests

26. A two-tailed test is performed at 95% confidence. The  $p$ -value is determined to be 0.09. The null hypothesis
- must be rejected
  - should not be rejected
  - could be rejected, depending on the sample size
  - has been designed incorrectly

ANS: B                      PTS: 1                      TOP: Hypothesis Tests

27. For a one-tailed test (lower tail) at 89.8% confidence,  $Z =$
- 1.27
  - 1.53
  - 1.96
  - 1.64

ANS: A                      PTS: 1                      TOP: Hypothesis Tests

28. For a one-tailed hypothesis test (upper tail) the  $p$ -value is computed to be 0.034. If the test is being conducted at 95% confidence, the null hypothesis
- could be rejected or not rejected depending on the sample size
  - could be rejected or not rejected depending on the value of the mean of the sample
  - is not rejected
  - is rejected

ANS: D                      PTS: 1                      TOP: Hypothesis Tests

29. In a one-tailed hypothesis test (lower tail) the test statistic is determined to be -2. The  $p$ -value for this test is
- 0.4772
  - 0.0228
  - 0.0056
  - 0.5228

ANS: B

PTS: 1

TOP: Hypothesis Tests

#### Exhibit 9-8

The average gasoline price of one of the major oil companies in Europe has been \$1.25 per liter. Recently, the company has undertaken several efficiency measures in order to reduce prices. Management is interested in determining whether their efficiency measures have actually **reduced** prices. A random sample of 49 of their gas stations is selected and the average price is determined to be \$1.20 per liter. Furthermore, assume that the standard deviation of the population ( $\sigma$ ) is \$0.14.

30. Refer to Exhibit 9-8. The value of the test statistic for this hypothesis test is
- 1.96
  - 1.645
  - 2.5
  - 1.645

ANS: C

PTS: 1

TOP: Hypothesis Tests

#### Exhibit 9-9

The sales of a grocery store had an average of \$8,000 per day. The store introduced several advertising campaigns in order to **increase** sales. To determine whether or not the advertising campaigns have been effective in increasing sales, a sample of 64 days of sales was selected. It was found that the average was \$8,300 per day. From past information, it is known that the standard deviation of the **population** is \$1,200.

31. Refer to Exhibit 9-9. The correct null hypothesis for this problem is
- $\mu \leq 8000$
  - $\mu > 8000$
  - $\mu = 8000$
  - $\mu > 8250$

ANS: A

PTS: 1

TOP: Hypothesis Tests

32. Refer to Exhibit 9-9. The  $p$ -value is
- 2.00
  - 0.9772
  - 0.0228
  - 0.5475

ANS: C

PTS: 1

TOP: Hypothesis Tests

33. In a two-tailed hypothesis test situation, the test statistic is determined to be  $t = -2.692$ . The sample size has been 45. The  $p$ -value for this test is
- 0.005
  - +0.005
  - 0.01
  - +0.01

ANS: D

PTS: 1

TOP: Hypothesis Tests

34. For a two-tailed test, a sample of 20 at 80% confidence,  $t =$
- 1.328
  - 2.539
  - 1.325
  - 2.528

ANS: A

PTS: 1

TOP: Hypothesis Tests

35. For a one-tailed test (lower tail), a sample size of 10 at 90% confidence,  $t =$
- 1.383
  - 2.821
  - 1.383
  - 2.821

ANS: C

PTS: 1

TOP: Hypothesis Tests

36. For a one-tailed test (lower tail) with 22 degrees of freedom at 95% confidence, the value of  $t =$
- 1.383
  - 1.383
  - 1.717
  - 1.721

ANS: C

PTS: 1

TOP: Hypothesis Tests

**Exhibit 9-1**

$n = 36$        $\bar{x} = 24.6$        $S = 12$        $H_0: \mu \leq 20$   
 $H_a: \mu > 20$

37. Refer to Exhibit 9-1. The  $p$ -value is between
- 0.005 to 0.01
  - 0.01 to 0.025
  - 0.025 to 0.05
  - 0.05 to 0.10

ANS: B

PTS: 1

TOP: Hypothesis Tests

**Exhibit 9-2**

$n = 64$        $\bar{x} = 50$        $s = 16$        $H_0: \mu \geq 54$   
 $H_a: \mu < 54$

38. Refer to Exhibit 9-2. The test statistic equals

- a. -4
- b. -3
- c. -2
- d. -1

ANS: C      PTS: 1      TOP: Hypothesis Tests

39. Refer to Exhibit 9-2. If the test is done at 95% confidence, the null hypothesis should

- a. not be rejected
- b. be rejected
- c. Not enough information is given to answer this question.
- d. None of these alternatives is correct.

ANS: B      PTS: 1      TOP: Hypothesis Tests

**Exhibit 9-3**

$n = 49$        $\bar{x} = 54.8$        $s = 28$        $H_0: \mu \leq 50$   
 $H_a: \mu > 50$

40. Refer to Exhibit 9-3. The  $p$ -value is between

- a. 0.01 to 0.025
- b. 0.025 to 0.05
- c. .05 to 0.1
- d. 0.1 to 0.2

ANS: D      PTS: 1      TOP: Hypothesis Tests

**Exhibit 9-4**

The manager of a grocery store has taken a random sample of 100 customers. The average length of time it took the customers in the sample to check out was 3.1 minutes with a standard deviation of 0.5 minutes. We want to test to determine whether or not the mean waiting time of all customers is significantly more than 3 minutes.

41. Refer to Exhibit 9-4. The test statistic is

- a. 1.96
- b. 1.64
- c. 2.00
- d. 0.056

ANS: C      PTS: 1      TOP: Hypothesis Tests



42. Refer to Exhibit 9-4. At 95% confidence, it can be concluded that the mean of the population is
- significantly greater than 3
  - not significantly greater than 3
  - significantly less than 3
  - significantly greater than 3.18

ANS: A

PTS: 1

TOP: Hypothesis Tests

**Exhibit 9-6**

A random sample of 16 students selected from the student body of a large university had an average age of 25 years and a standard deviation of 2 years. We want to determine if the average age of all the students at the university is significantly more than 24. Assume the distribution of the population of ages is normal.

43. Refer to Exhibit 9-6. The  $p$ -value is between
- .005 to .01
  - .01 to .025
  - .025 to .05
  - .05 to .10

ANS: C

PTS: 1

TOP: Hypothesis Tests

**Exhibit 9-7**

A random sample of 16 statistics examinations from a large population was taken. The average score in the sample was 78.6 with a variance of 64. We are interested in determining whether the average grade of the population is significantly more than 75. Assume the distribution of the population of grades is normal.

44. Refer to Exhibit 9-7. The test statistic is
- 0.45
  - 1.80
  - 3.6
  - 8

ANS: B

PTS: 1

TOP: Hypothesis Tests

45. Refer to Exhibit 9-7. At 95% confidence, it can be concluded that the average grade of the population
- is not significantly greater than 75
  - is significantly greater than 75
  - is not significantly greater than 78.6
  - is significantly greater than 78.6

ANS: B

PTS: 1

TOP: Hypothesis Tests

**Exhibit 9-5**

A random sample of 100 people was taken. Eighty-five of the people in the sample favored Candidate A. We are interested in determining whether or not the proportion of the population in favor of Candidate A is significantly more than 80%.

46. Refer to Exhibit 9-5. The test statistic is
- 0.80
  - 0.05
  - 1.25
  - 2.00

ANS: C

PTS: 1

TOP: Hypothesis Tests

47. Refer to Exhibit 9-5. At 95% confidence, it can be concluded that the proportion of the population in favor of candidate A
- is significantly greater than 80%
  - is not significantly greater than 80%
  - is significantly greater than 85%
  - is not significantly greater than 85%

ANS: B

PTS: 1

TOP: Hypothesis Tests

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