Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

1. **For T in {0,1,2,3}, H0 has PMF (0.44,0.31,0.17,0.08) and HA has PMF (0.08,0.17,0.27,0.48). Choose between rejection sets {3} and {2,3} when alpha may not exceed 0.090. Report the chosen set and its alpha.**

Assumptions: The displayed PMFs are complete and outcomes are mutually exclusive.

Reference: For each candidate, alpha is the sum of its probabilities under H0.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

2. **A valid test of H0 versus HA reports p=0.056 at alpha=0.05. State the decision and write a conclusion that does not treat failure to reject as proof of H0.**

Assumptions: The test design and assumptions were checked before the p-value was calculated.

Reference: Reject when p<=alpha; otherwise fail to reject.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

3. **For T in {0,1,2,3}, H0 has PMF (0.46,0.27,0.19,0.08) and HA has PMF (0.10,0.21,0.28,0.41). Reject H0 when T is in {3}. Find alpha, beta, and power.**

Assumptions: The displayed hypotheses specify the full sampling distributions.

Reference: alpha=P(reject|H0); beta=P(fail to reject|HA); power=1-beta=P(reject|HA).

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

4. Independent measurements follow N(mu, 49) with known variance 49. Investigators ask whether the population mean exceeds 54. State H0 and HA, classify each as simple or composite, and name the tail direction.

Assumptions: Measurements are iid normal with unknown fixed mean mu and known sigma=7.

Reference: A one-sided null includes its boundary and all parameter values opposite HA.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

5. **Test H0: mu=55 against HA: mu>55 with known sigma=8, n=25, and alpha=0.05. Find the critical sample mean and power at mu=59.**

Assumptions: Observations are independent normal measurements and sigma is known.

Reference: Normal reference: z_(1-alpha)=1.644853492. At mu=59, the printed cutoff standardizes to z=-0.855146508, with P(Z>-0.855146508)=0.8037650223.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

6. Independent measurements follow N(mu, 81) with known variance 81. Investigators ask whether the population mean exceeds 56. State H0 and HA, classify each as simple or composite, and name the tail direction.

Assumptions: Measurements are iid normal with unknown fixed mean mu and known sigma=9.

Reference: A one-sided null includes its boundary and all parameter values opposite HA.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

7. **A valid test of H0 versus HA reports p=0.121 at alpha=0.01. State the decision and write a conclusion that does not treat failure to reject as proof of H0.**

Assumptions: The test design and assumptions were checked before the p-value was calculated.

Reference: Reject when p<=alpha; otherwise fail to reject.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

8. **Test H0: mu=58 against HA: mu>58 with known sigma=11, n=25, and alpha=0.05. Find the critical sample mean and power at mu=65.**

Assumptions: Observations are independent normal measurements and sigma is known.

Reference: Normal reference: z_(1-alpha)=1.644853492. At mu=65, the printed cutoff standardizes to z=-1.536964690, with P(Z>-1.536964690)=0.9378490030.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

1. **For T in {0,1,2,3}, H0 has PMF (0.44,0.31,0.17,0.08) and HA has PMF (0.08,0.17,0.27,0.48). Choose between rejection sets {3} and {2,3} when alpha may not exceed 0.090. Report the chosen set and its alpha.**

Assumptions: The displayed PMFs are complete and outcomes are mutually exclusive.

Reference: For each candidate, alpha is the sum of its probabilities under H0.

Answer: Reject for T in {3}; alpha=0.08.

1. For {3}, alpha=0.08. For {2,3}, alpha=0.25.
2. The selected set has the greater alternative probability among candidates satisfying alpha<=0.090.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

2. **A valid test of H0 versus HA reports p=0.056 at alpha=0.05. State the decision and write a conclusion that does not treat failure to reject as proof of H0.**

Assumptions: The test design and assumptions were checked before the p-value was calculated.

Reference: Reject when p<=alpha; otherwise fail to reject.

Answer: Fail to reject H0 at alpha=0.05; the data do not establish that H0 is true.

1. Compare 0.056 with 0.05.
2. The result is inconclusive about HA; H0 has not been proved.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

3. **For T in {0,1,2,3}, H0 has PMF (0.46,0.27,0.19,0.08) and HA has PMF (0.10,0.21,0.28,0.41). Reject H0 when T is in {3}. Find alpha, beta, and power.**

Assumptions: The displayed hypotheses specify the full sampling distributions.

Reference: alpha=P(reject|H0); beta=P(fail to reject|HA); power=1-beta=P(reject|HA).

Answer: alpha=0.08, beta=0.59, power=0.41.

1. alpha=0.08=0.08.
2. power=0.41=0.41; beta=1-power=0.59.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

4. Independent measurements follow N(mu, 49) with known variance 49. Investigators ask whether the population mean exceeds 54. State H0 and HA, classify each as simple or composite, and name the tail direction.

Assumptions: Measurements are iid normal with unknown fixed mean mu and known sigma=7.

Reference: A one-sided null includes its boundary and all parameter values opposite HA.

Answer: H0: mu<=54 (composite); HA: mu>54 (composite); upper-tailed.

1. The research direction is greater than 54.
2. The null contains every mu<=54; its boundary mu=54 supplies the test distribution.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

5. **Test H0: mu=55 against HA: mu>55 with known sigma=8, n=25, and alpha=0.05. Find the critical sample mean and power at mu=59.**

Assumptions: Observations are independent normal measurements and sigma is known.

Reference: Normal reference: z_(1-alpha)=1.644853492. At mu=59, the printed cutoff standardizes to z=-0.855146508, with P(Z>-0.855146508)=0.8037650223.

Answer: Reject when x-bar>57.6318; power=0.8038.

1. Critical x-bar=55+1.644853492(8/sqrt(25))=57.631765587.
2. Power=P_mu=59(x-bar>57.631765587)=P(Z>-0.855146508)=0.8037650223, so the final answer is 0.8038.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

6. Independent measurements follow N(mu, 81) with known variance 81. Investigators ask whether the population mean exceeds 56. State H0 and HA, classify each as simple or composite, and name the tail direction.

Assumptions: Measurements are iid normal with unknown fixed mean mu and known sigma=9.

Reference: A one-sided null includes its boundary and all parameter values opposite HA.

Answer: H0: mu<=56 (composite); HA: mu>56 (composite); upper-tailed.

1. The research direction is greater than 56.
2. The null contains every mu<=56; its boundary mu=56 supplies the test distribution.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

7. **A valid test of H0 versus HA reports p=0.121 at alpha=0.01. State the decision and write a conclusion that does not treat failure to reject as proof of H0.**

Assumptions: The test design and assumptions were checked before the p-value was calculated.

Reference: Reject when p<=alpha; otherwise fail to reject.

Answer: Fail to reject H0 at alpha=0.01; the data do not establish that H0 is true.

1. Compare 0.121 with 0.01.
2. The result is inconclusive about HA; H0 has not been proved.

Name _____ Score _____ Teacher _____ Date _____

Hypothesis Tests, Errors, and Power

Worked Answer Key

State H0 and HA before selecting a rejection rule. Track every probability under the distribution named in its conditioning statement.

8. **Test H0: mu=58 against HA: mu>58 with known sigma=11, n=25, and alpha=0.05. Find the critical sample mean and power at mu=65.**

Assumptions: Observations are independent normal measurements and sigma is known.

Reference: Normal reference: z_(1-alpha)=1.644853492. At mu=65, the printed cutoff standardizes to z=-1.536964690, with P(Z>-1.536964690)=0.9378490030.

Answer: Reject when x-bar>61.6187; power=0.9378.

1. Critical x-bar=58+1.644853492(11/sqrt(25))=61.618677682.
2. Power=P_mu=65(x-bar>61.618677682)=P(Z>-1.536964690)=0.9378490030, so the final answer is 0.9378.