

# Math 21 Online – Final Review Key

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## Part 1

1) 601 American citizens

2) 3510 students

3) We are 84% confident that the proportion of all Americans who have seen a UFO is between 0.0253 and 0.0547.

4) We are 95% confident that the mean age of men at their first marriage is between 20.04 and 27.16 years old.

5)

1.  $H_0: \mu = 5$

$H_1: \mu > 5$

2.  $\alpha = 0.05$

3. One Mean Test

4.  $t = 2.44$ , P-value = 0.0116

5. Reject  $H_0$ . There is sufficient evidence to conclude that the mean number of hours practiced by symphony musicians is greater than 5 hours per week.

6)

1.  $H_0: p = 0.5$

$H_1: p < 0.5$

2.  $\alpha = 0.05$

3. One Proportion Test

4.  $z = -2.60$ , P-value = 0.0046

5. Reject  $H_0$ . There is sufficient evidence to conclude that less than half of all Americans believe that UFO's are real.

7)

1.  $H_0$ : Health is independent of level of education.

$H_1$ : Health is dependent on level of education.

2.  $\alpha = 0.05$

3. Independence Test

4. Chi Square = 137.72, P-value < 0.0001

5. Reject  $H_0$ . There is sufficient evidence to conclude that health is dependent on level of education.

8)

1. Population #1: Males

$H_0$ :  $p_1 = p_2$

$H_1$ :  $p_1 \neq p_2$

2.  $\alpha = 0.05$

3. Two Proportion Test

4.  $z = 1.37$ , P-value = 0.1713

5. Fail to Reject  $H_0$ . There is NOT sufficient evidence to conclude that the proportion of males that have at least one tattoo is different than the proportion of females that have at least one tattoo.

9)

1. Population #1: Departing Passengers

$H_0$ :  $\mu_1 = \mu_2$

$H_1$ :  $\mu_1 \neq \mu_2$

2.  $\alpha = 0.05$

3. Two Mean Test

4.  $t = -0.85$ , P-value = 0.4013

5. Fail to Reject  $H_0$ . There is NOT sufficient evidence to conclude that the mean walking speed for departing passengers is different than the mean walking speed for arriving passengers.

10)

1.  $H_0: p_1 = 0.13, p_2 = 0.14, p_3 = 0.13, p_4 = 0.24, p_5 = 0.20, p_6 = 0.16$

$H_1$ : At least one proportion is different than claimed.

2.  $\alpha = 0.05$

3. Goodness of Fit Test

4. Expected Frequencies: 52, 56, 52, 96, 80, 64

Chi Square = 18.74, P-value = 0.0022

5. Reject  $H_0$ . There is sufficient evidence to conclude that at least one proportion is different than claimed.

11)

1.  $H_0: \mu_1 = \mu_2 = \mu_3$

$H_1$ : At least one mean is different than the others.

2.  $\alpha = 0.05$

3. ANOVA

4.  $F = 3.77$ , P-value = 0.0378

5. Reject  $H_0$ . There is sufficient evidence to conclude that least one mean is different than the others.

12)

1.  $d = \text{Father} - \text{Son}$

$H_0: \mu_d = 0$

$H_1: \mu_d < 0$

2.  $\alpha = 0.05$

3. Paired Difference Test

4.  $t = -0.39$ , P-value = 0.3508

5. Fail to Reject  $H_0$ . There is NOT sufficient evidence to conclude that sons are taller than their fathers.



4)

1.  $H_0: p = 0.20$

$H_1: p > 0.20$

2.  $\alpha = 0.05$

3. One Proportion Test

4.  $z = 1.58$ , P-value = 0.0567

5. Fail to Reject  $H_0$ . There is NOT sufficient evidence to conclude that more than 20% of all Americans smoke.

5)

1.  $H_0: \mu = 20$

$H_1: \mu < 20$

2.  $\alpha = 0.01$

3. One Mean Test

4.  $t = -1.27$ , P-value = 0.1018

5. Fail to Reject  $H_0$ . There is NOT sufficient evidence to conclude that the mean long distance monthly bill is less than \$20.

6)

1. Population #1: People getting off plane

$H_0: p_1 = p_2$

$H_1: p_1 \neq p_2$

2.  $\alpha = 0.05$

3. Two Proportion Test

4.  $z = 2.88$ , P-value = 0.004

5. Reject  $H_0$ . There is sufficient evidence to conclude that the two proportions are not equal.

7)

1.  $d = \text{Aluminum Bat} - \text{Wooden Bat}$

$H_0: \mu d = 0$

$H_1: \mu d > 0$

2.  $\alpha = 0.05$

3. Paired Difference Test

4.  $t = 1.84$ , P-value = 0.0413

5. Reject  $H_0$ . There is sufficient evidence to conclude that more home runs are hit with an aluminum bat than with a wooden bat.

8)

1.  $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$

$H_1$ : At least one mean is different than the others.

2.  $\alpha = 0.05$

3. ANOVA

4.  $F = 13.85$ , P-value = 0.0001

5. Reject  $H_0$ . There is sufficient evidence to conclude that least one mean is different than the others.