Math 21 Online – Final Review Key

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.

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5)

1. H_0: p = 0.5 H_1: p < 0.5   2. α = 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.

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6)

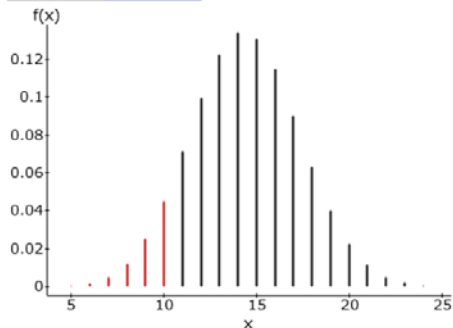1. H_0: p = 0.4 H_1: p < 0.4   2. α = 0.05

3. One Proportion Test – Binomial   4. P-value = 0.0904

5. Fail to reject H_0. There is not sufficient evidence to conclude that less than 40% of COS students own an iPhone.

7)

1. Population #1: Males H_0: p1 = p2 H_1: p1 ≠ p2

2. α = 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.

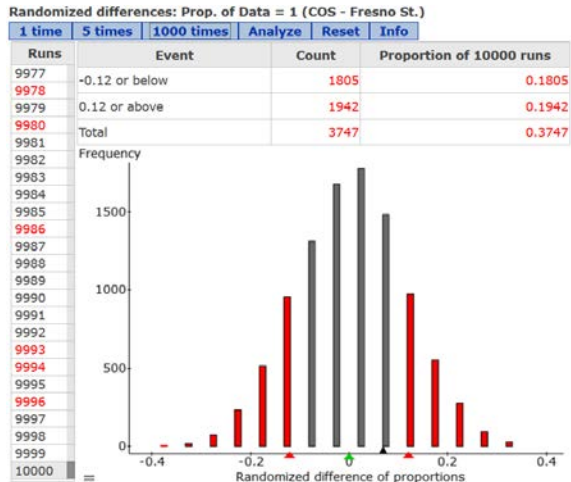8)

1. Population #1: COS H_0: p1 = p2 H_1: p1 > p2

2. α = 0.05   3. 2 Prop. Randomization Test   4. P-value = 0.1805 (Yours will vary)

5. Fail to Reject H_0. There is NOT sufficient evidence to conclude that the proportion of female students at COS is higher than it is at Fresno State.

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9)

1. H_0: μ = 5 H_1: μ > 5   2. α = 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.

10)

1. H_0: M = 70 H_1: M > 70   2. α = 0.05

3. One Mean Test – Sign Test   4. P-value = 0.0352

5. Reject H_0. There is sufficient evidence to conclude that the median score is above 70.

Hypothesis test results:
median : median of Variable
H_0 : median = 70
H_A : median > 70

Variable	n	n for test	Sample Median	Below	Equal	Above	P-value
var1	8	8	79.5	1	0	7	0.0352

11)

1. d = Father – Son H_0: μd = 0 H_1: μd < 0

2. α = 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.

12)

1. d = Practice – Final H_0: μd = 0 H_1: μd < 0

2. α = 0.05   3. P. Diff. – Wilcoxon   4. P-value = 0.0062

5. Reject H_0. There is sufficient evidence to conclude that students improve their scores from the practice test to the actual exam.

Hypothesis test results:
median : median difference between Practice and Final
H_0 : median = 0
H_A : median < 0

Variable	n	n for test	Median Est.	Wilcoxon Stat.	P-value	Method
Practice-Final	9	9	-9	1	0.0062	Norm. Approx.

13)

1. Pop. #1: Departing | $H_0: \mu1 = \mu2$ | $H_1: \mu1 \neq \mu2$

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.

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14)

1. Pop. #1: Male | $H_0: M1 = M2$ | $H_1: M1 > M2$

2. $\alpha = 0.05$ | 3. 2 Mean – Mann-Whitney | 4. P-value = 0.0015

5. Reject H_0. There is sufficient evidence to conclude that the median height of male college students is greater than the median height of female college students.

Hypothesis test results:
m1 = median of Male
m2 = median of Female
m1-m2 : m1 - m2
H_0 : m1-m2 = 0
H_A : m1-m2 > 0

Difference	n_1	n_2	Diff. Est.	Test Stat.	P-value	Method
$m_1 - m2_2$	6	8	7.5	68.5	0.0015	Norm. Approx.

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15)

1. H_0: p1 = 0.50, p2 = 0.375, p3 = 0.1125 | H_1: At least one proportion is different than claimed.

2. $\alpha = 0.05$ | 3. Goodness of Fit Test

4. Expected Frequencies: 100, 75, 25 | Chi Square = 3.73, P-value = 0.1546

5. Fail to Reject H_0. There is NOT sufficient evidence to conclude that at least one proportion is different than claimed.

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16)

1. H_0: Ice cream preference is independent of gender.
H_1: Ice cream preference is dependent on gender.

2. $\alpha = 0.05$ | 3. Independence Test | 4. Chi Square = 45.83, P-value < 0.0001

5. Reject H_0. There is sufficient evidence to conclude that ice cream preference is dependent on gender.

17)

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 = 0.62, P-value = 0.6103

5. Fail to Reject H_0. There is <u>NOT</u> sufficient evidence to conclude that least one mean is different than the others.

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18)

1. H_0: M1 = M2 = M3 H_1: At least one median is different than the others.

2. $\alpha = 0.05$ 3. ANOVA – Kruskal-Wallis   4. P-value = 0.3108

5. Fail to Reject H_0. There is NOT sufficient evidence to conclude that least one median is different than the others.

Kruskal-Wallis results:
Data stored in separate columns.
Results adjusted for ties

DF	Chi-Square	P-value
2	2.3369461	0.3108

Summary statistics

Column ⬍	n ⬍	Median ⬍	Ave. Rank ⬍
M200	7	22	12.714286
M230	5	20	11.1
M21	8	19	8.1875

Part 2

1)

1. H_0: Political affiliation is independent of income level.
H_1: Political affiliation is dependent on income level.

2. $\alpha = 0.05$ 3. Independence Test   4. Chi Square = 76.35, P-value < 0.0001

5. Reject H_0. There is sufficient evidence to conclude that political affiliation is dependent on income level.

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2)

1. H_0: p1 = 0.2, p2 = 0.2, p3 = 0.2, p4 = 0.2, p5 = 0.2
H_1: At least one proportion is different than claimed.

2. $\alpha = 0.05$ 3. Goodness of Fit Test   4. Chi Square = 4.77, P-value = 0.3119

5. Fail to Reject H_0. There is NOT sufficient evidence to conclude that at least one proportion is different than claimed.

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3)

1. Population #1: Method A H_0: $\mu 1 = \mu 2$ H_1: $\mu 1 \neq \mu 2$

2. $\alpha = 0.01$ 3. Two Mean Test   4. t = 0.80, P-value = 0.4292

5. Fail to Reject H_0. There is NOT sufficient evidence to conclude that the two methods have different mean assembly times.

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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.

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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: p1 = p2 H_1: p1 ≠ p2

2. α = 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.

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7)

1. d = Aluminum Bat – Wooden Bat H_0: μd = 0 H_1: μd > 0

2. α = 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.

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8)

1. H_0: μ1 = μ2 = μ3 = μ4 H_1: At least one mean is different than the others.

2. α = 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.

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9) UNKNOWN Problem

1. Population #1: Men H_0: $\sigma_1^2 = \sigma_2^2$ H_1: $\sigma_1^2 > \sigma_2^2$

2. α = 0.05   3. Two Variance Test   4. Test Stat = 0.50, P-value = 0.0844

5. Fail to Reject H_0. There is NOT sufficient evidence to conclude that men have more variability in their systolic blood pressure than women.

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10) JOURNAL Problem

1. Population #1: Exenatide H_0: μ1 = μ2 H_1: μ1 ≠ μ2

2. α = 0.05   3. Two Mean Test   4. t = -12.62, P-value < 0.0001

5. Reject H_0. There is sufficient evidence to conclude that there is a significant difference between Exenatide and Insulin Glargine for reducing BMI.