Student: _____	Instructor: Andreas Lazari	Assignment: Chapter 10.2-Homework
Date: _____	Course: Math2620 F - Fall 2018	

1. Test the hypothesis using the P-value approach. Be sure to verify the requirements of the test.

H_0: $p = 0.7$ versus H_1: $p > 0.7$

$n = 200$; $x = 160$; $\alpha = 0.1$

Click here to view page 1 of the table.[1] Click here to view page 2 of the table.[2]

Calculate the test statistic, z_0.

$z_0 =$ 3.09

(Round to two decimal places as needed.)

From TI83/84

$Z_0 = 3.086066999 \simeq 3.09$

P-value $= 0.001014189 \simeq 0.001$

Identify the P-value.

P-value = 0.001

(Round to three decimal places as needed.)

Choose the correct result of the hypothesis test for the P-value approach below.

- ○ **A.** Reject the null hypothesis, because the P-value is greater than α.
- ○ **B.** Do not reject the null hypothesis, because the P-value is less than α.
- ● **C.** Reject the null hypothesis, because the P-value is less than α.
- ○ **D.** Do not reject the null hypothesis, because the P-value is greater than α.

1: Standard Normal Distribution table for negative z

use TI83/84.

Standard Normal Distribution

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
−3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
−3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
−3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
−3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
−2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
−2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
−2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
−2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
−2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
−2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
−2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
−2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
−2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
−2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
−1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
−1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
−1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
−1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
−1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
−1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681

1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09

use TI 83/84

2. Test the hypothesis using the P-value approach. Be sure to verify the requirements of the test.

$H_0: p = 0.7$ versus $H_1: p > 0.7$

$n = 200$; $x = 150$, $\alpha = 0.1$

Is $np_0(1 - p_0) \geq 10$? $\Rightarrow 200(.7)(1-.7) = 42 > 10$

- ○ No
- ● Yes

From TI 83/84 the p-value is 0.0614113

Use technology to find the P-value.

P-value = 0.061

(Round to three decimal places as needed.)

since p-vale $< \alpha$ we Reject H_0.

(1) Reject the null hypothesis, because the P-value is (2) less than α.

(1) ○ Do not reject ● Reject

(2) ● less ○ greater

3. Test the hypothesis using the P-value approach.

H_0: $p = 0.55$ versus H_1: $p < 0.55$

$n = 150$, $x = 78$, $\alpha = 0.10$

use TI83/84

Perform the test using the P-value approach.

P-value = 0.2301 (Round to four decimal places as needed.)

P-value = 0.23009393 ≈ 0.2301

Choose the correct answer below.

P-value ≥ α Fail to reject H_0

.2301 > α = .10

- ○ **A.** Since P-value > α, reject the null hypothesis.
- ○ **B.** Since P-value < α, reject the null hypothesis
- ● **C.** Since P-value > α, do not reject the null hypothesis
- ○ **D.** Since P-value < α, do not reject the null hypothesis.

4. Test the hypothesis using the P-value approach. Be sure to verify the requirements of the test.

H_0: $p = 0.55$ versus H_1: $p < 0.55$

$n = 150$, $x = 78$, $\alpha = 0.05$

Is $np_0(1 - p_0) \geq 10$?

$150(.55)(1-.55) = 37.125 > 10$

- ○ No
- ● Yes

use TI83/84

P-value = 0.23009393 ≈ 0.230

Use technology to find the P-value.

P-value = 0.230 (Round to three decimal places as needed.)

(1) Do not Reject the Null Hypothesis because the P-value is (2) greater than α.

(1)
- ● Do not reject the null hypothesis,
- ○ Reject the null hypothesis,

(2)
- ○ less
- ● greater

5. Test the hypothesis using the P-value approach. Be sure to verify the requirements of the test.

$H_0: p = 0.77$ versus $H_1: p \neq 0.77$

$n = 500$, $x = 380$, $\alpha = 0.01$

Is $np_0(1-p_0) \geq 10$? Select the correct choice below and fill in the answer box to complete your choice.
(Type an integer or a decimal. Do not round.)

$500(.77)(1-.77) \geq 88.55 \geq 10$

- (●) **A.** Yes, because $np_0(1-p_0) =$ 88.55.
- ( ) **B.** No, because $np_0(1-p_0) =$ _____.

From TI 83/84

Now find $\hat{p}$.

$\hat{p} = \frac{x}{n} = \frac{380}{500} = 0.76$

$\hat{p} =$ 0.76 (Type an integer or a decimal. Do not round.)

$z_0 = -0.5313439 \approx 0.53$

Find the test statistic z_0.

$z_0 =$ −0.53 (Round to two decimal places as needed.)

P-value: $0.5951804 \approx 0.595$

Find the P-value.

P-value = 0.595 (Round to three decimal places as needed.)

State the conclusion of the hypothesis test.

(1) Do not reject the Null Hypothesis because the P-value is (2) greater than α.

(1)
- ( ) Reject the null hypothesis,
- (●) Do not reject the null hypothesis,

(2)
- (●) greater
- ( ) less

Since is a clinical trial we can reasonably assume the data to be random.

6. In a clinical trial, 17 out of 829 patients taking a prescription drug daily complained of flulike symptoms. Suppose that it is known that 1.7% of patients taking competing drugs complain of flulike symptoms. Is there sufficient evidence to conclude that more than 1.7% of this drug's users experience flulike symptoms as a side effect at the $\alpha = 0.01$ level of significance?

$829(0.017)(1-0.017) = 13.8534$

Because $np_0(1-p_0)$ = 13.89 (1) > 10, the sample size is (2) less than 5% of the population size, and the sample (3) can be reasonably assumed to be random the requirements for testing the hypothesis (4) are satisfied.
(Round to one decimal place as needed.)

What are the null and alternative hypotheses?

H_0: (5) p (6) = 0.017 versus

H_1: (7) p (8) > 0.017
(Type integers or decimals. Do not round.)

From TI 83/84:

$Z_0 = 0.781027 \simeq 0.78$

P-value. $0.2173929 \simeq 0.217$

Find the test statistic, z_0.

z_0 = 0.78 (Round to two decimal places as needed.)

Find the P-value.

P-value = 0.217 (Round to three decimal places as needed.)

Choose the correct conclusion below.

- ○ **A.** Since P-value < α, reject the null hypothesis and conclude that there is sufficient evidence that more than 1.7% of the users experience flulike symptoms.
- ○ **B.** Since P-value > α, reject the null hypothesis and conclude that there is not sufficient evidence that more than 1.7% of the users experience flulike symptoms.
- ○ **C.** Since P-value < α, do not reject the null hypothesis and conclude that there is sufficient evidence that more than 1.7% of the users experience flulike symptoms.
- ● **D.** Since P-value > α, do not reject the null hypothesis and conclude that there is not sufficient evidence that more than 1.7% of the users experience flulike symptoms.

(1) ● > ○ < ○ ≠ ○ =

(2) ● less than ○ greater than

(3) ○ is given to not be random, ○ is given to be random, ○ cannot be reasonably assumed to be random, ● can be reasonably assumed to be random,

(4) ○ are not ● are

(5) ○ σ ○ μ ● p

(6) ● = ○ < ○ ≠ ○ >

(7) ● p ○ σ ○ μ

(8) ● > ○ ≠ ○ < ○ =

7. According to a certain government agency for a large country, the proportion of fatal traffic accidents in the country in which the driver had a positive blood alcohol concentration (BAC) is 0.38. Suppose a random sample of 109 traffic fatalities in a certain region results in 51 that involved a positive BAC. Does the sample evidence suggest that the region has a higher proportion of traffic fatalities involving a positive BAC than the country at the $\alpha = 0.01$ level of significance?

$109(0.38)(1-0.38) = 25.6804 \approx 25.7$

Because $np_0(1-p_0)$ = 25.7 (1) > 10, the sample size is (2) less than 5% of the population size, and the sample (3) is given to be random. the requirements for testing the hypothesis (4) are. satisfied.
(Round to one decimal place as needed.)

What are the null and alternative hypotheses?

H_0: (5) p (6) = 0.38 versus

H_1: (7) p (8) > 0.38
(Type integers or decimals. Do not round.)

From TI 83/84

$Z_0 = 1.8904474 \approx 1.89$

Find the test statistic, z_0.

z_0 = 1.89 (Round to two decimal places as needed.)

P-value = 0.029349 $\approx$ 0.029

Find the P-value.

P-value = 0.029 (Round to three decimal places as needed.)

Determine the conclusion for this hypothesis test. Choose the correct answer below.

- ○ **A.** Since P-value > α, reject the null hypothesis and conclude that there is sufficient evidence that the region has a higher proportion of traffic fatalities involving a positive BAC than the country.
- ● **B.** Since P-value > α, do not reject the null hypothesis and conclude that there is not sufficient evidence that the region has a higher proportion of traffic fatalities involving a positive BAC than the country.
- ○ **C.** Since P-value < α, reject the null hypothesis and conclude that there is sufficient evidence that the region has a higher proportion of traffic fatalities involving a positive BAC than the country.
- ○ **D.** Since P-value < α, do not reject the null hypothesis and conclude that there is not sufficient evidence that the region has a higher proportion of traffic fatalities involving a positive BAC than the country.

(1) ○ < ○ = ○ ≠ ● >

(2) ○ greater than ● less than

(3) ○ is given to not be random, ● is given to be random, ○ cannot be reasonably assumed to be random, ○ can be reasonably assumed to be random,

(4) ○ are not ● are

(5) ○ σ ○ μ ● p

(6) ○ < ○ ≠ ● = ○ >

(7) ○ σ ○ μ ● p

(8) ● > ○ < ○ ≠ ○ =

Can be reasonably assumed to be random.

8. In a previous poll, 44% of adults with children under the age of 18 reported that their family ate dinner together seven nights a week. Suppose that, in a more recent poll, 446 of 1063 adults with children under the age of 18 reported that their family ate dinner together seven nights a week. Is there sufficient evidence that the proportion of families with children under the age of 18 who eat dinner together seven nights a week has decreased? Use the $\alpha = 0.01$ significance level.

$1063(.44)(1-.44) = 261.92 \approx 261.9$

Because $np_0(1-p_0) =$ 261.9 (1) > 10 and the sample size is (2) less than 5% of the population size, and the sample (3) can be reasonably assumed to be random the requirements for testing the hypothesis (4) are satisfied.

(Round to one decimal place as needed.)

What are the null and alternative hypotheses?

H_0: (5) p (6) = 0.44 versus

H_1: (7) p (8) < 0.44

(Type integers or decimals. Do not round.)

Find the test statistic, z_0.

$z_0 =$ −1.34 (Round to two decimal places as needed.)

use TI 83/84

$z_0 = -1.342062 \approx -1.34$

P-Value $= 0.089787 \approx 0.090$

Find the P-value.

P-value = 0.090 (Round to three decimal places as needed.)

Is there sufficient evidence that the proportion of families with children under the age of 18 who eat dinner together seven nights a week has decreased? Choose the correct answer below.

- ○ **A.** Yes, there is sufficient evidence because the P-value is greater than the level of significance. Therefore, reject the null hypothesis.
- ○ **B.** Yes, there is sufficient evidence because the P-value is greater than the level of significance. Therefore, do not reject the null hypothesis.
- ● **C.** No, there is not sufficient evidence because the P-value is greater than the level of significance. Therefore, do not reject the null hypothesis.
- ○ **D.** No, there is not sufficient evidence because the P-value is greater than the level of significance. Therefore, reject the null hypothesis.

(1) ○ ≠ ● > ○ = ○ <

(2) ○ greater than ● less than

(3) ○ is given to not be random, ○ is given to be random, ● can be reasonably assumed to be random, ○ cannot be reasonably assumed to be random,

(4) ○ are not ● are

(5) ○ σ ● p ○ μ

(6) ○ < ○ ≠ ○ > ● =

(7) ● p ○ μ ○ σ

(8) ○ > ○ ≠ ○ = ● <

9. Twenty years ago, 57% of parents of children in high school felt it was a serious problem that high school students were not being taught enough math and science. A recent survey found that 287 of 750 parents of children in high school felt it was a serious problem that high school students were not being taught enough math and science. Do parents feel differently today than they did twenty years ago? Use the $\alpha = 0.1$ level of significance.

→ Can be reasonably assumed to be random.

$750(.57)(1-.57) = 183.825$

Because $np_0(1-p_0) =$ 183.8 (1) > 10, the sample size is (2) less than 5% of the population size, and the sample (3) can be reasonably assumed to be random the requirements for testing the hypothesis (4) are satisfied.

(Round to one decimal place as needed.)

What are the null and alternative hypotheses?

H_0: (5) p (6) = 0.57 versus

H_1: (7) p (8) ≠ 0.57

(Type integers or decimals. Do not round.)

use TI83/84

Find the test statistic.

$z_0 = -10.36$ (Round to two decimal places as needed.)

$Z_0 = -10.3627 \simeq -10.36$

P-value $= 3.743135E^{-25}$

$\simeq 0.000000\ldots037431 \simeq 0.000$ (25 zeros)

Find the P-value.

P-value = 0.000 (Round to three decimal places as needed.)

Determine the conclusion for this hypothesis test. Choose the correct answer below.

- ○ **A.** Since P-value < α, do not reject the null hypothesis and conclude that there is sufficient evidence that parents feel differently today.
- ○ **B.** Since P-value > α, reject the null hypothesis and conclude that there is not sufficient evidence that parents feel differently today.
- ○ **C.** Since P-value > α, do not reject the null hypothesis and conclude that there is not sufficient evidence that parents feel differently today.
- ● **D.** Since P-value < α, reject the null hypothesis and conclude that there is sufficient evidence that parents feel differently today.

(1) ○ ≠ ● > ○ < ○ =

(2) ● less than ○ greater than

(3) ○ cannot be reasonably assumed to be random, ● can be reasonably assumed to be random, ○ is given to be random, ○ is given to not be random,

(4) ○ are not ● are

(5) ○ μ ● p ○ σ

(6) ● = ○ > ○ < ○ ≠

(7) ○ μ ● p ○ σ

(8) ○ = ● ≠ ○ < ○ >

10. In a survey, 37% of the respondents stated that they talk to their pets on the telephone. A veterinarian believed this result to be too high, so she randomly selected 180 pet owners and discovered that 61 of them spoke to their pet on the telephone. Does the veterinarian have a right to be skeptical? Use the $\alpha = 0.05$ level of significance.

can be reasonably assumed to be random.

$180(.37)(1-.37) = 41.9 \approx 42$

Because $np_0(1-p_0)$ = 42 (1) > 10, the sample size is (2) less than 5% of the population size, and the sample (3) is given to be random the requirements for testing the hypothesis (4) are satisfied.
(Round to one decimal place as needed.)

What are the null and alternative hypotheses?

H_0: (5) p (6) = 0.37 versus

H_1: (7) p (8) < 0.37.
(Type integers or decimals. Do not round.)

From TI83/84

$Z_0 = -0.864531 \approx -0.86$

Find the test statistic, z_0.

z_0 = −0.86 (Round to two decimal places as needed.)

P-value = 0.193648 ≈ 0.194

Find the P-value.

P-value = 0.194 (Round to three decimal places as needed.)

Does the veterinarian have a right to be skeptical?

- ○ **A.** The veterinarian does not have a right to be skeptical. There is not sufficient evidence to conclude that the true proportion of pet owners who talk to their pets on the telephone is 37%.
- ● **B.** The veterinarian does not have a right to be skeptical. There is not sufficient evidence to conclude that the true proportion of pet owners who talk to their pets on the telephone is less than 37%.
- ○ **C.** The veterinarian has a right to be skeptical. There is sufficient evidence to conclude that the true proportion of pet owners who talk to their pets on the telephone is not 37%.
- ○ **D.** The veterinarian has a right to be skeptical. There is sufficient evidence to conclude that the true proportion of pet owners who talk to their pets on the telephone is less than 37%.

(1) ● > ○ ≠ ○ = ○ <

(2) ○ greater than ● less than

(3) ● can be reasonably assumed to be random, ○ cannot be reasonably assumed to be random, ○ is given to not be random, ○ is given to be random,

(4) ○ are not ● are

(5) ○ μ ● p ○ σ

(6) ● = ○ > ○ ≠ ○ <

(7) ○ σ ● p ○ μ

(8) ○ = ○ > ● < ○ ≠

1. 3.09

0.001

C. Reject the null hypothesis, because the P-value is less than α.

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2. Yes

0.061

(1) Reject

(2) less

---

3. 0.2301

C. Since P-value > α, do not reject the null hypothesis

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4. Yes

0.230

(1) Do not reject the null hypothesis,

(2) greater

---

5. A. Yes, because $np_0\left(1-p_0\right)$ = **88.55** .

0.76

-0.53

0.595

(1) Do not reject the null hypothesis,

(2) greater

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6. 13.9

(1) >

(2) less than

(3) can be reasonably assumed to be random,

(4) are

(5) p

(6) =

0.017

(7) p

(8) >

0.017

0.78

0.217

D.
Since P-value > α, do not reject the null hypothesis and conclude that there is not sufficient evidence that more than 1.7% of the users experience flulike symptoms.

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7. 25.7

(1) >

(2) less than

(3) is given to be random,

(4) are

(5) p

(6) =

0.38

(7) p

(8) >

0.38

1.89

0.029

B.
Since P-value > α, do not reject the null hypothesis and conclude that there is not sufficient evidence that the region has a higher proportion of traffic fatalities involving a positive BAC than the country.

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8. 261.9

(1) >

(2) less than

(3) can be reasonably assumed to be random,

(4) are

(5) p

(6) =

0.44

(7) p

(8) <

0.44

− 1.34

0.090

C.
No, there is not sufficient evidence because the P-value is greater than the level of significance. Therefore, do not reject the null hypothesis.

---

9. 183.8

(1) >

(2) less than

(3) can be reasonably assumed to be random,

(4) are

(5) p

(6) =

0.57

(7) p

(8) ≠

0.57

− 10.36

0.000

D.
Since P-value < α, reject the null hypothesis and conclude that there is sufficient evidence that parents feel differently today.

---

10. 42.0

(1) >

(2) less than

(3) is given to be random,

(4) are

(5) p

(6) =

0.37

(7) p

(8) <

0.37

− 0.86

0.194

B.

The veterinarian does not have a right to be skeptical. There is not sufficient evidence to conclude that the true proportion of pet owners who talk to their pets on the telephone is less than 37%.