PRINTABLE VERSION

Quiz 12

You scored 100 out of 100

Question 1

Your answer is CORRECT.

In a hypothesis test, if the computed P-value is $\boxed{\text{greater th}}$an a specified level of significance, then we

a) reject the null hypothesis.

$p > \alpha$

b) fail to reject the null hypothesis.

Fail to reject the null hypothesis

c) retest with a different sample.

Question 2

Your answer is CORRECT.

A one-sided significance test gives a P-value of .03. From this we can

$1-p$

a) Say that the probability that the null hypothesis is true is .03.

$1 - .03 = .97$

b) Say that the probability that the null hypothesis is false is .03.

97 %

c) Reject the null hypothesis with 96% confidence.

RH_0

d) Reject the null hypothesis with 97% confidence.

Question 3

Your answer is CORRECT.

It is believed that the average amount of money spent per U.S. household per week on food is about \$98, with standard deviation \$10. A random sample of 100 households in a certain affluent community yields a mean weekly food budget of \$100. We want to test the hypothesis that the mean weekly food budget for all households in this community is higher than the national average. State the null and alternative hypotheses for this test.

$\mu = 98 \quad \sigma = 10 \quad n = 100$

a) H_0: $\mu = 100$, H_a: $\mu < 100$

$H_0: \mu = 98$

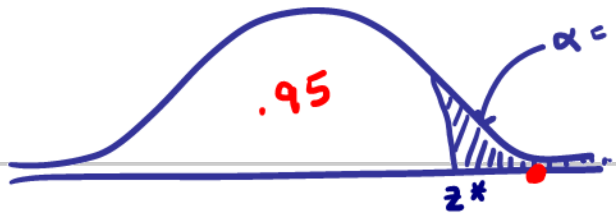
b) H_0: $\mu = 100$, H_a: $\mu > 100$

$H_a: \mu > 98$

c) H_o: $\mu = 98$, H_a: $\mu < 98$

d) H_o: $\mu = 98$, H_a: $\mu > 98$

e) H_o: $\mu = 98$, H_a: $\mu \neq 98$



$\alpha = .05$

$z^* = \text{invNorm}(.95)$

$z^* = 1.65$

Question 4

Your answer is CORRECT.

$\mu = 98$ $\sigma = 10$ $\alpha = 0.05$

It is believed that the average amount of money spent per U.S. household per week on food is about $98, with standard deviation $10. A random sample of 100 households in a certain affluent community yields a mean weekly food budget of $100. We want to test the hypothesis that the mean weekly food budget for all households in this community is higher than the national average. Are the results significant at the 5% level?

$n = 100$ $\bar{x} = 100$ $H_o: \mu_o = 98$

$H_a: \mu_a > 98$

a) Yes, we should reject H_o.

b) No, we should fail to reject H_o.

$$z = \frac{100 - 98}{\frac{10}{\sqrt{100}}} = 2$$

p-value : $p(z > 2) = 1 - \text{pnorm}(2)$
$= 0.023$

$\boxed{\text{Reject } H_o}$ $p < \alpha$

Question 5

Your answer is CORRECT.

population

Based on information from a large insurance company, 66% of all damage liability claims are made by single people under the age of 25. A random sample of 52 claims showed that 42 were made by single people under the age of 25. Does this indicate that the insurance claims of single people under the age of 25 is higher than the national percent reported by the large insurance company? State the null and alternate hypothesis.

$\hat{p} = \frac{42}{52}$

$H_o: p = .66$

$H_a: p > .66$

a) H_o: $p = .81$, H_a: $p > .81$

b) H_o: $p = .66$, H_a: $p < .66$

c) H_o: $p = .66$, H_a: $p > .66$

d) H_o: $p = .81$, H_a: $p < .81$

e) H_o: $p = .66$, H_a: $p \neq .66$

Question 6

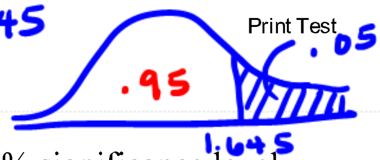
Your answer is CORRECT.

pop.

Based on information from a large insurance company, 67% of all damage liability claims are made by single people under the age of 25. A random sample of 51 claims showed that 43 were made by single people under the age of 25. Does this indicate that the insurance claims of single people under the age of 25 is higher than the national percent reported by the large insurance company? Give the

$\alpha = .05$ sig level

$\text{invNorm}(.95) = 1.645$



$H_0: p = .67$ $\quad \hat{p} = \frac{43}{51}$

$H_a: p > .67$

$$z = \frac{\frac{43}{51} - .67}{\sqrt{\frac{.67(1-.67)}{51}}} = \frac{0.173}{0.066}$$

$z = 2.63$

$P(z > 2.63) = 1 - \text{pnorm}(2.63) = 0.004 < \alpha$

$\boxed{\text{Reject } H_0}$

test statistic and your conclusion.

a) z = 2.130; reject H_o at the 5% significance level

b) z = -2.130; fail to reject H_o at the 5% significance level

c) z = 2.630; fail to reject H_o at the 5% significance level

d) z = 2.630; reject H_o at the 5% significance level

e) z = -2.630; reject H_o at the 5% significance level

Question 7

Your answer is CORRECT.

pop mean

Let x represent the hemoglobin count (HC) in grams per 100 milliliters of whole blood. The distribution for HC is approximately normal with $\mu = 14$ for healthy adult women. Suppose that a female patient has taken 12 laboratory blood samples in the last year. The HC data sent to her doctor is listed below. We would like to know if the data indicates this patient has significantly high HC compared to the population.

(19, 14, 23, 20, 15, 19, 21, 16, 18, 18, 16, 21)

State the null and alternate hypothesis.

$\mu = 14$
$n = 12$

a) H_o: $\mu = 14$, H_a: $\mu > 14$

$H_0: \mu = 14$

$H_a: \mu > 14$

b) H_o: $\mu = 14$, H_a: $\mu < 14$

c) H_o: $\mu = 18.3$, H_a: $\mu < 18.3$

d) H_o: $\mu = 18.3$, H_a: $\mu > 18.3$

e) H_o: $\mu = 14$, H_a: $\mu \neq 14$

```
num8=c(19,14,23,20,15,19,21,16,18,18,16,21)
> mean(num8)
[1] 18.33333
> sd(num8)
[1] 2.708013
```

Question 8

Your answer is CORRECT.

pop mean

$n = 12$

$\mu = 14$

Let x represent the hemoglobin count (HC) in grams per 100 milliliters of whole blood. The distribution for HC is approximately normal with $\mu = 14$ for healthy adult women. Suppose that a female patient has taken 12 laboratory blood samples in the last year. The HC data sent to her doctor is listed below. We would like to know if the data indicates this patient has significantly high HC compared to the population.

$\bar{x} = 18.3$

(19, 14, 23, 20, 15, 19, 21, 16, 18, 18, 16, 21)

Give the p-value and interpret the results. $H_0: \mu = 14$

$H_a: \mu > 14$

$s = 2.7$

a) p = .0001; Based on 5% significance level, I will reject the null hypothesis and conclude this

$t = \frac{18.33 - 14}{2.7/\sqrt{12}} = \frac{4.33}{0.779} = 5.56$ round .0001 (0.0000085

patient has a high HC level.

b) p = .001; Based on 5% significance level, I will reject the null hypothesis and conclude this patient has a high HC level.

$P(t > 5.56) = 1 - pt(5.56, 11) = 8.5 \times 10^{-5}$ $P < \alpha$ RH_0

c) p = .1053; Based on 5% significance level, I will fail to reject the null hypothesis and conclude this patient does not have a high HC level.

d) p = .0562; Based on 5% significance level, I will fail to reject the null hypothesis and conclude this patient does not have a high HC level.

e) p = .0762; Based on 5% significance level, I will fail to reject the null hypothesis and conclude this patient does not have a high HC level.

Question 9

$H_0: p = .5$ $H_a: p \neq .5$ $\alpha = .01$

Your answer is CORRECT.

An experimenter flips a coin 100 times and gets 57 heads. Test the claim that the coin is fair against the two-sided claim that it is not fair at the level α=.01.

$p = .5$ $\hat{p} = .57$

a) $H_0: p = .5$, $H_a: p \neq .5$; $z = 1.40$; Reject H_0 at the 1% significance level.

~~**b)**~~ $H_0: p = .5$, $H_a: p > .5$; $z = 1.41$; Fail to reject H_0 at the 1% significance level.

~~**c)**~~ $H_0: p = .5$, $H_a: p \neq .5$; $z = 1.41$; Fail to reject H_0 at the 1% significance level.

d) $H_0: p = .5$, $H_a: p \neq .5$; $z = 1.40$; Fail to reject H_0 at the 1% significance level.

~~**e)**~~ $H_0: p = .5$, $H_a: p > .5$; $z = 1.40$; Reject H_0 at the 1% significance level.

$z = \frac{.57 - .5}{\sqrt{\frac{(.5)(.5)}{100}}} = \frac{.07}{.05} = 1.4$

Question 10

2. $P(Z > 1.4) = 0.16 > \alpha$

Your answer is CORRECT.

In a experiment on relaxation techniques, subject's brain signals were measured before and after the relaxation exercises with the following results:

matched pairs df= 4

```
> num10=c(5,3,8,1,2)
> mean(num10)
[1] 3.8
> sd(num10)
[1] 2.774887
```

use $\alpha = .05$

Person	1	2	3	4	5
Before	31	37	66	52	28
After	26	34	58	51	26
Before - After	5	3	8	1	2

$\bar{x} = 3.8$ $s = 2.77$ $H_0: \mu_D = 0$ $H_a: \mu_D > 0$

Assuming the population is normally distributed, is there sufficient evidence to suggest that the relaxation exercise slowed the brain waves? (Use α=0.05)

$t = \frac{3.8}{2.77/\sqrt{5}} = 3.07$

a) Fail to reject the null hypothesis which states there is no change in brain waves.

RH_0

b) Reject the null hypothesis which states there is no change in brain waves in favor of the

$P(t > 3.07) = 1 - pt(3.07, 4) = 0.019 < \alpha$

alternate which states the brain waves slowed after relaxation.

c) There is not enough information to make a conclusion.

Question 11

Your answer is CORRECT.

An auditor for a hardware store chain wished to compare the efficiency of two different auditing techniques. To do this he selected a sample of nine store accounts and applied auditing techniques A and B to each of the nine accounts selected. The number of errors found in each of techniques A and B is listed in the table below:

$D = A - B$

$H_0: \mu_D = 0$

$H_a: \mu_D < 0$

$\alpha = 0.1$

accts	Errors in A	Errors in B	D= A - B
1	45	31	14
2	48	37	11
3	46	39	7
4	48	37	11
5	52	54	-2
6	50	45	5
7	49	49	0
8	40	41	-1
9	45	50	-5

```
num11=c(14,11,7,11,-2,5,0,-1,
-5)
> mean(num11)
[1] 4.444444
> sd(num11)
[1] 6.747427
```

Does the data provide sufficient evidence to conclude that the number of errors in auditing technique A is fewer than the number of errors in auditing technique B at the 0.1 level of significance? Select the [Alternative Hypothesis, Value of the Test Statistic]. (Hint: the samples are dependent)

$\mu_D < 0$

a) [A < B, 1.976]

b) [μD = 0, 1.976]

c) [μD < 0, 1.976]

d) [μD < μ1, 1.976]

e) [μD ≤ 0, 1.976]

f) None of the above

$$t = \frac{\bar{x} - \mu_D}{\frac{s}{\sqrt{n}}} = \frac{4.44}{\left(\frac{6.75}{3}\right)} = 1.973$$

test statistic

Question 12

Your answer is CORRECT.

An auditor for a hardware store chain wished to compare the efficiency of two different auditing techniques. To do this he selected a sample of nine store accounts and applied auditing techniques A and B to each of the nine accounts selected. The number of errors found in each of techniques A and B is listed in the table below:

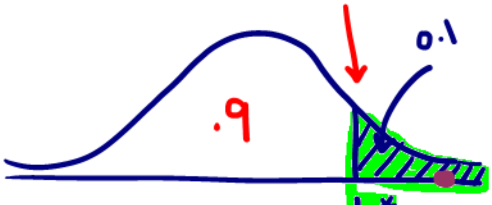
$n = 9$ $\alpha = 0.1$

$D = A - B$

$H_0: \mu_D = 0$

$H_a: \mu_D > 0$

$t > 1.4$



# of accts	Errors in A	Errors in B	D
1	25	11	14
2	28	17	11
3	26	19	7
4	28	17	11
5	32	34	-2
6	30	25	5
7	29	29	0
8	20	21	-1
9	25	30	-5

$\bar{x}_D = 4.44$

$s = 6.75$

$df = 8$

$t^* = qt(.9, 8)$

$t^* =$ qt(.9,8)
[1] 1.396815

Does the data provide sufficient evidence to conclude that the number of errors in auditing technique A is greater than the number of errors in auditing technique B at the 0.1 level of significance? Select the [Rejection Region, Decision of Reject (RH_0) or Failure to Reject (FRH_0)]. (Hint: the samples are dependent)

```
> num12=c(14,11,7,11,-2,5,0,-1,-5)
> mean(num12)
[1] 4.444444
> sd(num12)
[1] 6.747427
```

a) [t < -1.4 or -t < -1.4, RH0]

b) [t > 1.4, RH0]

c) [-t < 1.4 and t < 1.4, RH0]

d) [z < -1.4 and -z < -1.4, FRH0]

e) [t < -1.4, FRH0]

f) None of the above

$$t = \frac{\bar{x} - \mu_D}{\frac{s}{\sqrt{n}}} = \frac{4.44}{\left(\frac{6.75}{\sqrt{9}}\right)} = 1.97$$

pvalue: $p(t > 1.97) = 1 - pt(1.97, 8)$

= 1-pt(1.97,8)
[1] 0.04217183

$p < \alpha \Rightarrow$ Reject H_0

Question 13

Your answer is CORRECT.

Rejecting a true null hypothesis is classified as

a) Type II error

b) Type I error

c) Power

	H_0 True	H_0 false
Rej	Type I	Power
FR		Type II