correct /35 * 200

Spring 2015 MATH 160 Exam # 3 Form A **(chapters 7-10)** 200 points

NAME:_____

35?

Instructions: May use formula page, calculator and tables.
SHOW YOUR WORK. **Answers alone are not sufficient.** **If you are using your calculator, WRITE DOWN THE COMMAND USED.**

The monetary value of a diamond is determined by its exact quality as defined by the 4C's: cut, color, clarity and carat weight. The price and the carat weight of a diamond are the two most known characteristics. In order to understand the role carat weight has in determining the price of a diamond, the carat weight and price of 10 randomly selected loose round diamonds (color D and clarity VS1) are given below.

X Carat weight	.56	.90	.50	.53	.92	.51	.41	.40	.80	.57
Y Price in dollars	2055	5433	1735	1962	5554	1900	1264	1242	4182	2085

Round your values below to the thousandths place

1) Find the value of the linear correlation coefficient (r) Round to 3 places.

1 pt

LinReg T test

$r = .99140$

$\boxed{r = .991}$

2) Is there a significant linear correlation? (This is not just a "yes" or "no" question. NEATLY show **all steps in a hypothesis test** leading to your answer for credit) (method 1)

1 pt 1) $H_0: \rho = 0$ NO S.L.C.
$H_1: \rho \neq 0$ S.L.C.

P-value < α
reject H_0

1 pt 2) $t = 21.429$

1 pt 3) P-value $2.3666 \times 10^{-8} \approx 0$

1 pt 4) There is a SLC

method 2

2) $r = .991$

3) C.V. $-.632$ $.632$

reject H_0

3) If a significant linear correlation exists, find the regression **equation**. If there is no significant linear correlation, find $\bar{y}$.

1 pt $\hat{y} = a + bx$ $\hat{y} = -2487.42 + 8571.50x$

If NO SLC then

3) $\bar{y} = 2741.2$

4) $y = 2741$

4) According to this information, what is the best predicted price for a 0.75-carat loose diamond? Round to the nearest dollar.

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1 pt $\hat{y} = -2487.42 + 8571.50(.75)$ $\hat{y} = 3941$

4 pts

5) Surgical complications: A medical researcher wants to construct a 99% confidence interval for the proportion of knee replacement surgeries that result in complications. He found an article in the Journal of Bone and Joint Surgery that reported that approximately 8% of such operations result in complications. Using this estimate, what sample size is needed so that the confidence interval will have a margin of error of 0.04?

$$n = \frac{(z_{\alpha/2})^2 \hat{p}\hat{q}}{E^2}$$

$$n = \frac{2.575^2 (.08)(.92)}{.04^2}$$

$n = 305.00875$

Round up

$\boxed{n = 306}$

A study comparing attitudes toward death was conducted using the Death Anxiety Scale known as the DAS. On this scale, highs scores indicate high anxiety concerning death. The DAS results are given below for a random sample of organ and non-organ donors. The study's goal was to compare attitudes toward death between organ donors and non-organ donors.

$\alpha = 1 - .95$ $\quad \bar{x}_1 - \bar{x}_2 = -2.26$

	n	Mean	Standard deviation
Organ donors	25 n_1	5.36 $\bar{x}_1$	2.91 s_1
Non-organ donors	69 n_2	7.62 $\bar{x}_2$	3.45 s_2

6) Construct a 95% confidence interval for the difference between the two population means. Round to three places.

1 pt

$$\bar{x}_1 - \bar{x}_2 - E < \mu_1 - \mu_2 < \bar{x}_1 - \bar{x}_2 + E$$

$$-2.26 - E < \mu_1 - \mu_2 < -2.26 + E$$

1 pt → 2 Samp T int

$\boxed{-3.696 < \mu_1 - \mu_2 < -.824}$

2 pts

OR

$$E = 2.064\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$= 1.475758557$$

1 pt

$\boxed{-3.736 < \mu_1 - \mu_2 < -.784}$

1 pt

7) Is there a difference in attitudes toward death between the two groups? Explain for credit.

Since Zero is not included

Yes there is a difference.

They are not the Same

$\mu_1 - \mu_2 \neq 0$

$\mu_1 \neq \mu_2$

1 pt

✓ 8) In a survey of families in which both parents work, one of the questions asked was, "have you refused a job, promotion, or transfer because it would mean less time with your family? " A total of 200 men and 200 women were asked this question. "Yes" was the response given by 29% of men and 24% of women. Test the claim that the proportion of men who answered "Yes" ~~was~~ greater than the proportion of women who answered "Yes". Use a .05 significance level.

Claim $P_1 > P_2$

Clearly label and show all your steps in your process for credit:

recognizing P_1, P_2 ← 1pt

P_1 Men	P_2 Women
$n_1 = 200$	$n_2 = 200$
$\hat{P}_1 = .29$	$\hat{P}_2 = .24$
$X_1 = n_1 \hat{P}_1$	$X_2 = n_2 \hat{P}_2$
$X_1 = 58$	$X_2 = 48$

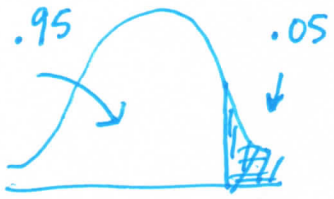
1) H_0: $P_1 = P_2$
H_1: $P_1 > P_2$ (claim) ← 2 pts

2) T.S. $Z = 1.13$ ← 1pt OR $Z = \dfrac{\hat{P}_1 - \hat{P}_2 - (P_1 - P_2)}{\sqrt{\frac{\bar{P}\bar{Q}}{n_1} + \frac{\bar{P}\bar{Q}}{n_2}}} = 1.13$

3) P-value .1286 > α 1pt
Fail to reject H_0

2-prop Z Test

3) C.V. 1.645



Fail to reject H_0

4) There is not sufficient Sample evidence to ← 1pt Support the claim that the proportion of men who answered Yes is greater than the Proportion of women who answered Yes.

Wrong if the word "warrant" is in the conclusion

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A nationwide random sample of college students revealed that 24 students consumed an average of 226 mg of caffeine each day, with a standard deviation of 48 mg. Assuming that the amount of caffeine consumed per person daily is normally distributed, test the claim that the mean amount of caffeine consumed daily by college students is less than 250 mg? Use a significance level of 0.05.

According to the experts there are no health risks associated with moderate caffeine use, which is about 250 mg a day.

9) Which parameter is being tested here?

1 pt

a) μ b) P c) σ d) P_1, P_2 e) μ_1, μ_2 f) μ_d

1 pt 10) The null hypothesis is $\mu = 250$

1 pt 11) The alternate hypothesis is $\mu < 250$ (claim)

1 pt 12) The test statistic is $t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$ or T-test

$t = -2.449$

$= \frac{(226 - 250)}{(48/\sqrt{24})}$

1 pt 13) The critical value is -1.714

$\alpha = .05$

$df = 23$

1 pt 14) Choose one. a) FAIL TO REJECT H_0 b) REJECT H_0.

If (14) is wrong and marked as (A) then (15) only correct if (B)

15) **Which is the correct conclusion for the problem.** A

1 pt

a) The sample data support the claim that the mean amount of caffeine consumed daily by college students is less than 250 mg

b) There is not sufficient sample evidence to support the claim that the mean amount of caffeine consumed daily by college students is less than 250 mg

c) There is sufficient evidence to warrant rejection of the claim that the mean amount of caffeine consumed daily by college students is less than 250 mg

d) There is not sufficient evidence to warrant rejection of the claim that the mean amount of caffeine consumed daily by college students is less than 250 mg

A sample of eight subjects with borderline-high cholesterol levels were obtained from a study that involved taking a nutrition education class. Cholesterol readings were taken before the class and 3 months after the class. Test the claim that cholesterol levels went down after the nutrition class. Use significance level of .05 $\alpha = .05$

L3 L4

Before class	295	279	250	235	255	290	310	260
After class	265	266	249	240	230	235	350	280
d	30	13	1	-5	25	55	-40	-20

1pt →

16) The null hypothesis is $\mu_d = 0$ 1pt ↗

17) The alternate hypothesis is $\mu_d > 0$ (claim) 1pt ↗

18) The test statistic is $t = .695$ 1pt

19) The P-value is .2548 1pt

T-Test

P-value > α

.2548 > .05

Use the DATA option from your calculator for credit and write down the command.

d > 0 Levels went down

d = 0 no Change

If (19) is wrong but still > .05 then 20 + 21 can still be correct

If (19) is Less than .05 then grade 20) B 21) A

20) Choose one. a) FAIL TO REJECT H_0 b) REJECT H_0. 1pt

21) **Which is the correct conclusion for the problem.** B

a) The sample data support the claim that cholesterol levels went down after the nutrition class.

b) There is not sufficient sample evidence to support the claim that cholesterol levels went down after the nutrition class. 1pt

c) There is sufficient evidence to warrant rejection of the claim that cholesterol levels went down after the nutrition class.

d) There is not sufficient evidence to warrant rejection of the claim that cholesterol levels went down after the nutrition class.

If (20) is wrong and marked as B then (21) only correct if A

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