Test 13A AP Statistics Name:

Directions: Work on these sheets. Answer completely, but be concise. *Tables are attached.*

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. Suppose we have two SRSs from two distinct populations and the samples are independent. We measure the same variable for both samples. Suppose both populations of the values of these variables are Normally distributed but the means and standard deviations are unknown. For purposes of comparing the two means, we use
   (a) Two-sample t procedures
   (b) Matched pairs t procedures
   (c) Two-proportion z procedures
   (d) The least-squares regression line
   (e) None of the above. The answer is _____.

2. We wish to test if a new feed increases the mean weight gain compared to an old feed. At the conclusion of the experiment it was found that the new feed gave a 10 kg bigger gain than the old feed. A two-sample t test with the proper one-sided alternative was done and the resulting P-value was 0.082. This means that
   (a) there is an 8.2% chance the null hypothesis is true.
   (b) there was only an 8.2% chance of observing an increase greater than 10 kg (assuming the null hypothesis was true).
   (c) there was only an 8.2% chance of observing an increase greater than 10 kg (assuming the null hypothesis was false).
   (d) there is an 8.2% chance the alternative hypothesis is true.
   (e) there is only an 8.2% chance of getting a 10 kg increase.

3. An SRS of size 100 is taken from a population having proportion 0.8 successes. An independent SRS of size 400 is taken from a population having proportion 0.5 successes. The sampling distribution of the difference in sample proportions has what mean?
   (a) 0.3
   (b) 0.15
   (c) The smaller of 0.8 and 0.5
   (d) The mean cannot be determined without the sampling results.
   (e) None of the above. The answer is _____.

4. A study was conducted to investigate the effectiveness of a new drug for treating Stage 4 AIDS patients. A group of AIDS patients was randomly divided into two groups. One group received the new drug; the other group received a placebo. The difference in mean subsequent survival (those with drugs – those without drugs) was found to be 1.04 years, and a 95% confidence interval was found to be 1.04 ± 2.37 years. Based upon this information, we can conclude that
   (a) the drug was effective since those taking the drug lived, on average, 1.04 years longer.
   (b) the drug was ineffective since those taking the drug lived, on average, 1.04 years less.
   (c) there is no evidence the drug was effective since the 95% confidence interval covers zero.
   (d) there is evidence the drug was effective since the 95% confidence interval does not cover zero.
   (e) we can make no conclusions since we do not know the sample size or the actual mean survival of each group.

The next two questions refer to this scenario.
Different varieties of fruits and vegetables have different amounts of nutrients. These differences are important when these products are used to make baby food. We wish to compare the carbohydrate content of two varieties of peaches. The data were analyzed with SAS, and the following output was obtained:

VARIETY	N	MEAN	STD DEV	STD ERROR	MIN	MAX
1	5	33.6	3.781	1.691	29.000	38.000
2	7	25.0	10.392	3.927	2.000	33.000

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.0110	8.0	0.0791
EQUAL	1.7490	10.0	0.1109

5. We wish to test if the two varieties are significantly different in their mean carbohydrate content. The null and alternative hypotheses are

(a) $H_0 : \mu_1 = \mu_2; H_a : \mu_1 < \mu_2$

(b) $H_0 : \mu_1 = \mu_2; H_a : \mu_1 > \mu_2$

(c) $H_0 : \mu_1 = \mu_2; H_a : \mu_1 \neq \mu_2$

(d) $H_0 : \bar{x}_1 = \bar{x}_2; H_a : \bar{x}_1 < \bar{x}_2$

(e) $H_0 : \bar{x}_1 = \bar{x}_2; H_a : \bar{x}_1 \neq \bar{x}_2$

6. The test statistic and *P*-value are

(a) 1.7490; 0.0318

(b) 1.7490; 0.0554

(c) 2.0110; 0.1582

(d) 2.0110; 0.0791

(e) 2.0110; 0.0396

7. Thirty-five people from a random sample of 125 workers from Company A admitted to using sick leave when they weren't really ill. Seventeen employees from a random sample of 68 workers from Company B admitted that they had used sick leave when they weren't ill. A 95% confidence interval for the difference in the proportions of workers at the two companies who would admit to using sick leave when they weren't ill is

(a) $0.03 \pm \sqrt{\dfrac{(0.28)(0.72)}{125} + \dfrac{(0.25)(0.75)}{68}}$

(b) $0.03 \pm 1.96\sqrt{\dfrac{(0.28)(0.72)}{125} + \dfrac{(0.25)(0.75)}{68}}$

(c) $0.03 \pm 1.645\sqrt{\dfrac{(0.28)(0.72)}{125} + \dfrac{(0.25)(0.75)}{68}}$

(d) $0.03 \pm 1.96\sqrt{\left(\dfrac{1}{125} + \dfrac{1}{68}\right)(0.269)(0.731)}$

(e) $0.03 \pm 1.645\sqrt{\left(\dfrac{1}{125} + \dfrac{1}{68}\right)(0.269)(0.731)}$

Part 2: Free Response

Answer completely, but be concise. Communicate your thinking clearly and completely.

8. Nitrites are often added to meat products as preservatives. In a study of the effect of these chemicals on bacteria, the rate of uptake of a radio-labeled amino acid was measured for a number of cultures of bacteria, some growing in a medium to which nitrites had been added. Here are the summary statistics from this study.

Group	n	$\bar{x}$	s
Nitrite	30	7880	1115
Control	30	8112	1250

(a) Carry out a test of the research hypothesis that nitrites decrease amino acid uptake and report your results.

(b) Construct and interpret a 95% confidence interval for the difference in population means.

9. Nicotine patches are often used to help smokers quit. Does giving medicine to fight depression also help? A randomized double-blind experiment assigned 244 smokers to receive nicotine patches and another 245 to receive both a patch and the antidepressant drug bupropion. *Results:* After a year, 40 subjects in the nicotine patch group had abstained from smoking, as had 87 in the patch-plus-drug group.

(a) Is this good evidence that adding bupropion increases the success rate? Carry out an appropriate test to help answer this question.

(b) Construct and interpret a 99% confidence interval for the difference in population proportions.

I pledge that I have neither given nor received aid on this test. _____