

FINAL

MATH 119 – FALL 2012 – KUNIYUKI
126 POINTS TOTAL, BUT 120 POINTS = 100%

**Show all work, simplify as appropriate, and use “good form and procedure” (as in class).
No notes or books allowed. A scientific calculator is allowed.**

**You may detach the attached tables and write on them. Turn in the tables with your test,
but any work written on them will not be graded.**

- **When rounding**, round off to at least four decimal places or four significant digits, whichever is more **detailed**. Round off final z values to two decimal places. Round off final t and χ^2 values to three decimal places.
- Assume that finite population correction factors do not apply.
- Do not use continuity corrections.

FOR PROBLEM 1, USE THE P -VALUE METHOD OF HYPOTHESIS TESTING.

Remember to:

- State the null and alternative hypotheses using notation (as in class), and identify which is the claim.
- Compute the value of the appropriate test statistic.
- Give the corresponding P -value.
- State whether or not the null hypothesis is rejected; this is your “decision.”
- Write your final conclusion relative to the claim using the kind of wording we used in class.

- 1) (21 points). The Howie Mandel Modeling Agency claims that the average height of its female models is equal to the average height of women nationwide, which is 63.6 inches. We randomly sample 33 female models with the agency. The average height of the sampled models is 64.8 inches. Use a significance level of 0.10 to test the agency's claim. Assume that the standard deviation of the heights of the agency's models is 2.5 inches, which is the standard deviation among women nationwide (we're probably being conservative). Use the z table and the P -value method of hypothesis testing.

FROM NOW ON, USE THE TRADITIONAL (CLASSICAL) METHOD OF HYPOTHESIS TESTING.

Remember to:

- State the null and alternative hypotheses, and identify which is the claim.
You must use the kind of notation that we have used in class.
- Compute the value of the appropriate test statistic.
- Find the critical value(s), and indicate the critical region.
- State whether or not the null hypothesis is rejected; this is your “decision.”
- Write your final conclusion relative to the claim using the kind of wording we used in class.

2) (21 points). The Windbag Publishing Company claims that the average length of its books is more than 1000 pages. In a study, 20 Windbag books are randomly sampled. The average length within the sample is 1085 pages, and the standard deviation within the sample is 120 pages. Assume that Windbag's book lengths in pages are approximately normally distributed. Use a significance level of 0.05 to test Windbag's claim. Use the t table and the traditional (classical) method of hypothesis testing.

3) (23 points). The Sideshow Bob Fan Club claims that more than 15% of the bits in Krusty-O cereal boxes are, in fact, metal. A consumer watchdog group conducts a study. A random sample of 300 Krusty-O bits is collected, and 57 of them are metal. Use a significance level of 0.01 to test the Sideshow Bob Fan Club's claim. Use the z table and the traditional (classical) method of hypothesis testing. You may assume that we can use the normal approximation to the binomial distribution. When rounding, round off to at least four significant digits. Hint: The test statistic is given by:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$$

4) (20 points). The North Park School District promotes standardized testing in its schools, while the South Park School District does not. We are conducting a study on the SAT scores of students in the two districts who took the SAT this year. The North Park district knows that the standard deviation of its SAT scores this year is 58 points. We take a random sample of 17 students in the South Park district who took the SAT this year, and their standard deviation is 67 points. Use a significance level of 0.05 to test the claim that the population standard deviation of the South Park district's SAT scores is equal to that of the North Park district's. Assume that the SAT scores in the South Park district this year are very close to normally distributed. Use the χ^2 table and the traditional (classical) method of hypothesis testing. Hint: The test statistic is given by:

$$\chi^2 = \frac{(n-1)s^2}{\sigma^2}$$

of degrees of freedom = $n - 1$

5) (8 points total). (Matching)

For each variable, the average is 50 and the standard deviation is 10.

For one of the graphs below, $r = -0.90$.

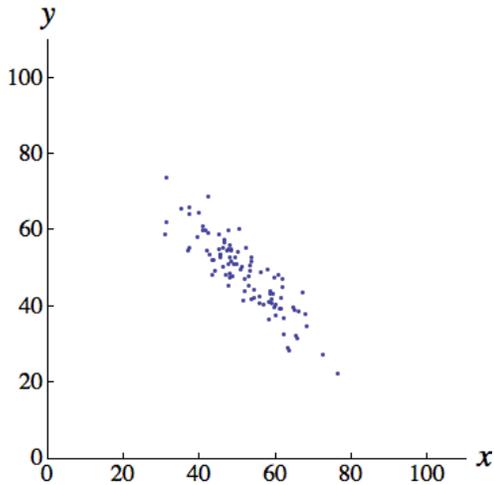
For one of the graphs below, $r = 0.00$.

For one of the graphs below, $r = 0.80$.

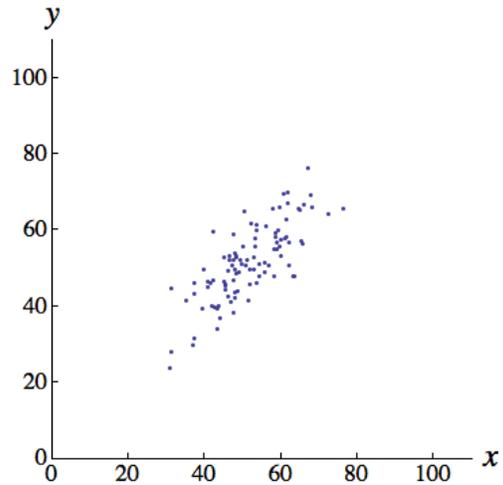
For one of the graphs below, $r = 0.95$.

Fill in the blanks:

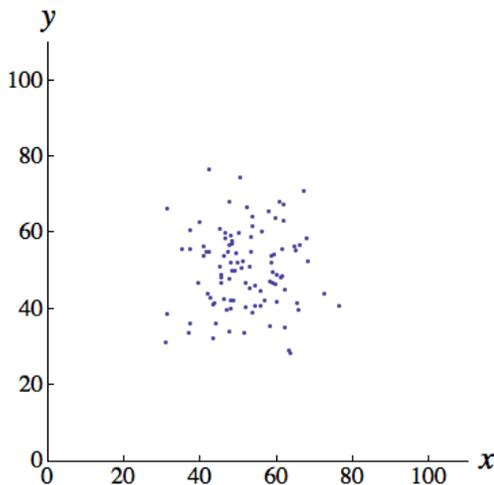
a) r for the graph below is _____.



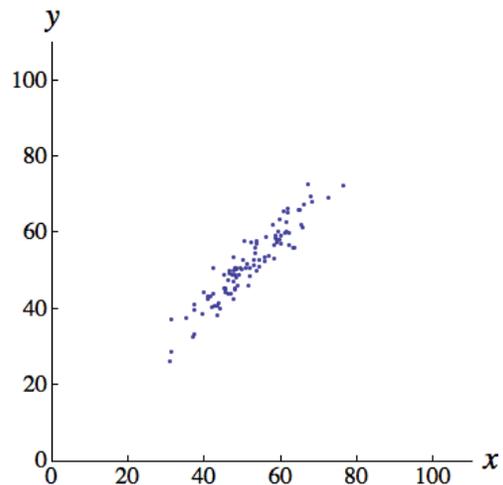
b) r for the graph below is _____.



c) r for the graph below is _____.



d) r for the graph below is _____.



6) (3 points). Fill in the blank: If a regression line for sample data is given by

$\hat{y} = 13 + 4x$, then, along the regression line, for every increase of 1 unit in x ,

there is an increase of _____ units in y .

7) (3 points). Given sample bivariate data involving two variables, x and y , we obtain $r = 0.7$ and find the corresponding least squares regression model $\hat{y} = b_0 + b_1x$. Based on our discussion in class, what proportion of the variance of y is “explained” by x and the regression model? Box in the best answer below:

- a) 7% b) 14% c) 30% d) 49% e) 70%

8) (27 points). A student claims that Professor Staff gives 35% of her students “A”s, 40% of her students “B”s, and 25% of her students “C”s. We randomly sample 90 of Staff’s students. Among those students, 28 received an “A” from Staff, 40 received a “B” from Staff, and 22 received a “C” from Staff. Test the student’s claim at the 0.10 significance level. Use the χ^2 table and the traditional (classical) method of hypothesis testing.

When rounding, round off to at least four decimal places.

You may round off your final test statistic value to three decimal places.

Hint: The test statistic is given by:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

of degrees of freedom = (# of categories) – 1