

PSYC 2317: Statistical Methods for Psychology

Tarleton State University

Exam 2

Instructions: please complete each problem below. You may submit your completed exam in Canvas using one of two file formats: either (1) write your solutions on paper and scan to a PDF, or (2) write your solutions in a Word/OpenOffice document. On either method, please show (or describe) as much work as possible. Report your final answers rounded to 2 decimal places. For any problem involving hypothesis testing, you will need to justify your answer by explicitly defining your null hypothesis \mathcal{H}_0 and alternative hypothesis \mathcal{H}_1 and reporting an appropriate p -value.

1. Twenty-five women between the ages of 70 and 80 were randomly selected from the general population of women their age to take part in a special program to decrease reaction time (speed). After the course, the women had an average reaction time of 688 milliseconds. Assume that the mean reaction time for the general population of women of this age group is 750 milliseconds with a standard deviation of 300 milliseconds.
 - (a) Compute a 95% confidence interval for μ , the population mean reaction time for women who have taken part in the program.
 - (b) Perform a hypothesis test to decide whether the course had a significant effect on reaction times.
2. A researcher knows that the weights of 6-year olds are normally distributed with a mean of 22.7 kg and $\sigma = 2.8$ kg. She suspects that children in poverty-stricken regions are undernourished and therefore underweight. With a sample of $N = 16$ children, the researcher obtains a sample mean of $\bar{X} = 20.9$ kg.
 - (a) Compute a 95% confidence interval for μ , the population mean weight for children in poverty-stricken regions.
 - (b) Perform a hypothesis test to decide whether children in poverty-stricken regions are significantly underweight.
3. The spotlight effect refers to overestimating the extent to which others notice your appearance or behavior, especially when you commit a social faux pas. Effectively, you feel as if you are suddenly standing in a spotlight with everyone looking. In one demonstration of this phenomenon, Gilovich, Medvec, and Savitsky (2000) asked college students to put on a Barry Manilow T-shirt that fellow students had previously judged to be embarrassing. The participants were then led into a room in which other students were already participating in an experiment. After a few minutes, the participant was led back out of the room and was allowed to remove the shirt. Later, each participant was asked to estimate how many people in the room had noticed the shirt. The individuals who were in the room were also asked whether they noticed the shirt. In a similar study with $N = 9$ participants, the individuals who wore the shirt produced an average estimate of $\bar{X} = 6.4$ with $SS = 162$.
 - (a) Compute a 95% confidence interval for μ , the population mean self-rated estimate of how many people noticed the embarrassing behavior.
 - (b) Perform a hypothesis test to decide whether this population mean estimate was significantly greater than 3.1, the average number of people who *actually* noticed the shirt.

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4. A variety of experiments suggest that visual images interfere with visual perception. In one study, Segal and Fusella (1970) had participants watch a screen, looking for brief presentations of a small blue arrow. On some trials, the participants were also asked to form a mental image (for example, imagine a volcano). The results for a sample of $N = 36$ show that participants made an average of 1.8 more errors while forming images than while not forming images. The difference scores had $SS = 378$.
- (a) Compute a 95% confidence interval for μ , the population mean difference score.
 - (b) Perform a hypothesis test to decide whether people make significantly more errors on the task when forming visual images.
5. Downs and Abwender (2002) evaluated soccer players and swimmers to determine whether routine blows to the head experienced by soccer players produced long term neurological deficits. In the study, neurological tests were administered to mature soccer players and swimmers. In a similar study, a researcher obtained the following data:

Swimmers	Soccer players
$N_1 = 8$	$N_2 = 5$
$\bar{X}_1 = 9$	$\bar{X}_2 = 6$
$SS_1 = 44$	$SS_2 = 24$

- (a) Compute a 95% confidence interval for $\mu_1 - \mu_2$, the population mean difference in neurological scores between the two groups.
- (b) Compute an appropriate effect size (e.g., Cohen's d) to describe the mean difference in neurological scores between the two groups.
- (c) Perform a hypothesis test to decide whether the population mean neurological score for swimmers is significantly different from that of soccer players.