Prince Sultan University

Department of Mathematical Sciences

STAT 271 – Second Examination

28 April 2010

Time allowed: 90 minutes
Maximum points: 40 points

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1. (7 points) A researcher wishes to determine whether the salaries of professional nurses employed by privat hospitals are higher than those of nurses employed by government-owned hospitals. She selects a sample of nurses from each type of hospital and calculate the means and standard deviations of their salaries. At $\alpha = 0.01$, can she conclude that the private hospitals pay more than the government hospitals? Assume that the populations are approximately normally distributed. Use the *p*-value method.

Private	Government
$\bar{x}_1 = \$26800$	$\bar{x}_2 = \$25400$
$s_1 = \$600$	$s_2 = \$450$
$n_1 = 10$	$n_2 = 8$

2. (7 points) An article in the *Washington Post* steted that nearly 45% of the U.S. population is born with brown eyes, although they don't necessarily stay that way. To test the newspaper's claim, a random sample of 80 people was selected, and 32 had brown eyes. Is there sufficienf evidence to dispute the newspaper's claim regarding the proportion of brown-eyed people in the United States? Use $\alpha = 0.01$ and the *p*-value approach.

3. (6 points) To determine whether car ownership affects a student's academic achievement, two random samples of 100 male students were each drawn from the student body. The grade point average for the $n_1 = 100$ nonowners of cars had an average and variance equal to $\bar{x}_1 = 2.7$ and $s_1^2 = 0.36$, while $\bar{x}_2 = 2.54$ and $s_2^2 = 0.4$ for the $n_2 = 100$ car owners. Do the data present sufficient evidence to indicate a difference in the mean achievements between car owners and nonowners of cars? Use the critical value approach.

4. (6 points) The data represent a sample of the number of home fires started by candles for the past several years. Find the 99% confidence interval for the mean number of home fires started by candles each year.

5460 5900 6090 6310 7160 8440 9930

5. (7 points) Random samples of 200 bolts manufactured by a type A machine and 200 bolts manufactured by a type B machine showed 16 and 8 defective bolts, respectively. Do these data present sufficient evidence to suggest a difference in the performance of the machine types? Use the critical value approach.

6. (7 points) A new process for producing synthetic diamonds can be operated at a profitable level only if the average weight of the diamonds is greater than 0.5 karat. To evaluate the profitability of the process, six diamonds are generated, with recorded weights 0.46, 0.61, 0.52, 0.48, 0.57, and 0.54 karat. Do the six measurements present sufficient evidence to indicate that the average weight of the diamonds produced by the process is in excess of 0.5 karat? Use the *p*-value approach.
