Exam 2 for MGMT 230: Introductory Statistics
Name (10 points)

For every problem, clearly state if any further assumptions need to be made to solve the problem, and if so, what assumption. To show your work, whenever you use a formula to answer a question, write down the formula first, then write down the formula with the correct numbers plugged in.

Every question on this exam is a hypothesis test. For every hypothesis test, conduct every step of a hypothesis test, and also report and interpret the p-value for every test. Use any significance level you think is appropriate.

Rules: You must not work on this exam with any other person, with the following exception: You may discuss the exam and exam questions with other students if none of the people involved in the discussion have statistics materials or notes out, and no one is taking notes. That is, you must work independently on the exam, but if you want to discuss it over lunch or over a beer, you are welcome to. You may use your book, notes, and a computer when working on the exam.

1. (20 points) Suppose a newspaper claims that at least 1 in 4 workers find the advertisement for the job they receive in the classified section of their local newspaper. The claim is based on survey evidence from a random sample of 24 workers where 7 found their job in the classified section of the local paper. Test the hypothesis that the newspaper's claim is correct.

2. (20 points) A dollar theater charges only $2 admission for movies. These movies are slightly older than movies in most other theaters, but are recent enough that they have not yet been released on DVD. The dollar theater will make profits if and only if its customers on average spend more than $7.50 at the snack line. A random sample of 60 customers have an average snack counter expenditure equal to $8.50 and a standard deviation of $3.15. Test the hypothesis that the theater will make profits.

3. (20 points) The director of training for an electronic equipment manufacturer is interested in determining whether different training programs are more or less effective at making assembly line employees productive at producing a particular part. The director of training decides to randomly choose 50 employees and randomly assigns half of these employees to a computer-based training program and the other half to the team-based training program. Afterwords she computes the time it takes for these employees to put together a particular electronics component. For the group that attended the computer-based training, the average time to put together the component was 19.9 minutes and the standard deviation was 4.58 minutes. For the group that attended the team-based training, the average time was 17.5 minutes and the standard deviation was 1.9 minutes. Test the hypothesis that the two training programs lead to different average times for employees to produce the part. Make whatever assumption you want about the equality of the population variances between the two groups. Remember to clearly state any assumptions you are making.

4. (20 points) A certain blood plasma cancer treatment is effective at treating and eliminating the cancer if it reduces bone marrow microvessel density. Seven cancer patients are administered the treatment and their bone marrow microvessel density is measured before and after the treatments. These measurements are given by,

Patient	**Before Treatment**	**After Treatment**
1	158	284
2	189	214
3	202	101
4	353	227
5	416	290
6	426	176
7	441	290

Test the hypothesis that the treatment is effective at reducing bone marrow microvessel density.

5. (10 points) An automobile insurer is interested in estimating the different in the probability of having an automobile accident in a given year when a person lives more then 10 miles away from his or her workplace versus when the person lives closer. The insurance company has decided that if there is statistical evidence that the probability of an accident is at least 0.5% higher it will charge higher rates to those who live more than 10 miles from their workplace.

   In a random sample of 859 people who live more than 10 miles from their workplace, 17 were in an automobile accident during a one year period. In a random sample of 1150 people who live closer to their workplace, 13 were an automobile accident during the same period. Is there statistical evidence for the insurance company to charge a higher rate for those who live more than 10 miles from their home? Test the appropriate hypothesis.

   Beware! We have never done a problem like this in class, but you have learned enough to be able to figure it out. Your book *may* help you in that is does discuss hypothesis testing about a similar problem, but it does not have a hypothesis test or appropriate formulas for a problem exactly like this one.