Math 345, Elementary Statistics **06 April 2011**
Exam 2 **Crawford**
Name: _____

- No books or notes (in any form) allowed.
- You may use a calculator and the formula sheet.
- Clearly indicate your answers.
- All answers must have work or justification. Most explanations need only be 1-2 sentences.
- ***Show all your work*** – partial credit may be given for written work.
- Good Luck!

	Score
1	/12
2	/16
3	/16
4	/12
5	/12
6	/22
7	/12
Total	/100

1. (12 pts). When playing Roulette,

(a). If you bet \$5 on the number 7, you have a 1/38 chance of winning \$180. What is your expected value?

(b). If you bet \$5 that the number will be odd, you have a 18/38 chance of winning \$10. What is your expected value?

(c). Which one is the better bet? Why?

2. (16 pts). A recent study of American colleges found that 26% of college students live in campus housing. If 150 college students are randomly selected

(a). Find the probability that exactly 30 students from this group live in campus housing.

(b). Find the probability that more than 30 students from this group live in campus housing.

(c). What is the mean and standard deviation for the number of students living in campus housing for a group of 150 college students.

(d). Using the max/min usual values, would it be unusual for 48 students out of 150 to live in campus housing?

3. (16 pts). Credit card companies rely on sophisticated computer technology to track potentially fraudulent credit card charges for users of their credit card. They estimate that the mean number of potentially fraudulent charges each day is 9,528.

(a). Find the mean number of potentially fraudulent charges that are detected in a 10-minute interval.

(b). Find the probability that no more than 60 potentially fraudulent charges are detected in a 10-minute interval.

(c). Find the probability that at least 75 potentially fraudulent charges are detected in a 10-minute interval. Is it unusual to have at least 75?

(d). The company has a call center devoted specifically to contacting users about the potentially fraudulent activity. A typical first phone call takes 10 minutes. If they have 60 employees available to make these phone calls, do you think that it is sufficient or would you recommend they hire more employees? Justify your answer.

4. (12 pts). Airlines typically overbook flights because past experience shows that some passengers fail to show up. Let x represent the number of passengers who cannot be seated because a flight has been overbooked. The table below gives the corresponding probability distribution.

(a). Find the mean and standard deviation. Show all your work.

x	$P(x)$
0	0.805
1	0.123
2	0.057
3	0.009
4	0.004
5	0.002
6	0+

(b). Would being overbooked by 3 passengers be considered ***unusually low***? Justify your answer with work.

5. (12 pts).

(a). For the ***standard*** normal distribution, find the probability that z is greater than -1.13.

(b). Given a normal distribution with mean -1.6 and standard deviation of 0.2, find

(a) $P(x = -2.3)$ **(b).** $P(x < -1)$

6. (22 pts). The serum cholesterol levels in men aged 18-24 are normally distributed with a mean of 178.1 and standard deviation of 40.7 (the units are mg/100 mL). The categories for cholesterol levels are

- GOOD: below 200 mg/100 mL
- BORDERLINE HIGH: between 200 and 240 mg/100 mL
- HIGH: 240 mg/100 mL or higher

(a). If a man aged 18-24 is randomly selected, find the probabilities that his cholesterol levels fall into each of the 3 categories. [Your answer should give 3 separate probabilities.]

(b). Is it more likely for a man aged 18-24 to have GOOD cholesterol levels or not GOOD levels? Explain.

(c). What cholesterol level separates the bottom 10% from the top 90%?

7. (12 pts). Scores for women on the verbal portions of the SAT-I test are normally distributed with a mean of 502 and a standard deviation of 109 (based on data from the College Board).

(a). If one of the women is randomly selected, find the probability that her score is at least 535.

(b). If 25 of the women are randomly selected, find the probability that their mean score will be at least 535.

(c). Suppose the population of women from whom a sample of 25 was chosen were given the Columbia Review Course before taking the SAT test. If this sample of 25 women did, in fact, have a mean score of at least 535, does this give strong evidence that the review course was effective or not? Explain.