Statistics 2
Second Midterm Exam
Fall 2002

Printed Name _____
(Please also print your name at the top of each page)

Signature _____

Student ID # _____

Circle your TA: Ellen Chien   Chris Furgiuele   Megumi Harada

Pawel Lasieki   John Stambaugh

Circle the time of your section: 9:00   10:00   11:00   12:00   1:00

1	2	3	4	5	6	7	8	9	10	11	Total

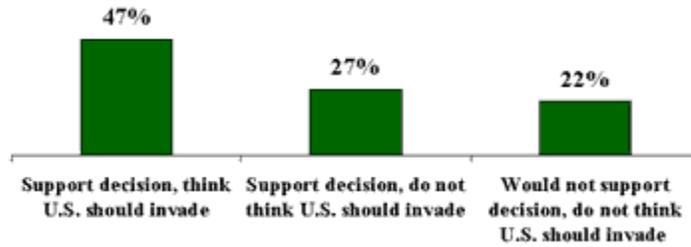***There are 11 problems. A Normal table is at the end of the exam.***

You can leave answers in unreduced form, for example as fractions, products, and factorials.

1. A fair coin is tossed three times.
    a. [1] The chance that the third toss is heads equals ____.
    b. [1] The chance that the third toss is heads given that the first two tosses are tails equals ____.

2. [2] A drawer contains three black socks and one red sock. Two socks are taken out in the dark. The chance that they are both black equals ____.

3. [2] Five cards are dealt from a shuffled deck.   The chance that at least one of them is a heart equals _____.
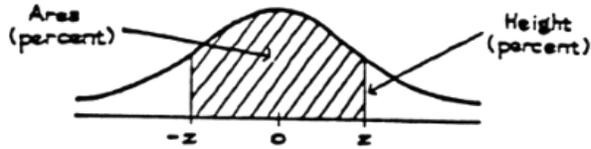
4. One card is dealt from a shuffled deck. For each of the following, write in the blanks "mutually exclusive" if the two events are mutually exclusive, and "independent" if the two events are independent. If they are both mutually exclusive and independent, write "both," and if they are neither mutually exclusive nor independent write "neither."
   a. [1] The card is an ace; the card is a heart. _____
   b. [1] The card is a heart; the card is a diamond _____

5. Circle those of the following which can be calculated using the binomial probability formula:
   a. [1] The chance that there are exactly three hearts among the first 20 cards dealt off the top of a shuffled deck.
   b. [1] The chance that you toss a coin eight times until you get a total of three heads.
   c. [1] The chance that a roulette wheel comes up black 12 times in 20 spins.

6. [2] A fair coin is tossed 100 times. The normal approximation is used to find approximately the chance of 50 or 51 heads. The result is the area under the normal curve between what two z-values (fill in the blanks)?
   _____ & _____

7. Lola tosses a fair coin 200 times and Manni tosses one 100 times. For each of the following, circle the more likely event.
   a. [1] Lola gets 100 heads   Manni gets 50 heads
   b. [1] Lola gets between 95 and 105   Manni gets between 45 and 55
   c. [1] Lola gets between 90 and 100   Manni gets between 45 and 55

8. Keno is a gambling game. If you bet a dollar on a single number and the number comes up you win, getting your dollar back plus $2 (you win $2). If you lose, you lose your dollar (you win -$1). Your chance of winning is 25%. Suppose you play Keno 100 times, betting $1 on a single number each time. Fill in the blanks with the answers to each question:
   a. [2] How much do you expect to win? _____
   b. [2] What is the standard error of your total winnings? _____
   c. [2] Approximately, what is the chance you come out ahead? _____

9. A city Housing Authority plans to survey households in rental units. (A household is defined as all the occupants of a single rental unit, for example, all the occupants of a single apartment). Indicate for each of the following whether the sample gathered as specified is a simple random sample of those households by circling "Yes" if it is and "No" if it is not.

    a. [1] [Yes No] Within each zip code in the city, a list of rental households is assembled and 100 of them are chosen at random without replacement. The resulting sample consists of all the rental households chosen in this way from all the zip codes.

    b. [1] [Yes No] A list of all buildings which contain rental units is compiled. 10% of them are chosen at random without replacement and then one rental unit from each of them is chosen at random.

    c. [1] [Yes No] A list of all people living in rental units is assembled, 100 of them are chosen at random without replacement, and for each of those 100, the household is selected to be in the sample.

10. The Housing Authority of the previous question planned to gather a simple random sample of 400 households out of a total of 20,000. One of the questions they planned to ask was the rent paid during the previous month. From a survey the previous year, the investigators figured that the SD should be about $200.

    a. [2] True or False. If this guess at the population SD was correct, the error in using the sample average to estimate the population average would be $5 or so.

    b. [2] The sample average rent paid was $1100 and the SD was $225. A 90% confidence interval for the population average is
    ____ to ____.

    c. [1] True or False. About 90% of the rents in the city should fall within the interval above.

11. In October 2002, the Gallup Poll asked 1000 people whether they would support President Bush if he decided to invade Iraq. Assume for purposes of this question that this was a simple random sample of a population. The results are shown in the following figure. Consider estimating the percentage of the population who would not support the decision and do not think the U.S. should invade.

   a. [2] Attach a standard error to the estimate of 22%: _____.

   b. [2] A 90% confidence interval for the population percentage is _____ to _____.

47%   27%   22%

Support decision, think U.S. should invade   Support decision, do not think U.S. should invade   Would not support decision, do not think U.S. should invade

Table

A NORMAL TABLE

z	Height	Area	z	Height	Area	z	Height	Area
0.00	39.89	0	1.50	12.95	86.64	3.00	0.443	99.730
0.05	39.84	3.99	1.55	12.00	87.89	3.05	0.381	99.771
0.10	39.69	7.97	1.60	11.09	89.04	3.10	0.327	99.806
0.15	39.45	11.92	1.65	10.23	90.11	3.15	0.279	99.837
0.20	39.10	15.85	1.70	9.40	91.09	3.20	0.238	99.863
0.25	38.67	19.74	1.75	8.63	91.99	3.25	0.203	99.885
0.30	38.14	23.58	1.80	7.90	92.81	3.30	0.172	99.903
0.35	37.52	27.37	1.85	7.21	93.57	3.35	0.146	99.919
0.40	36.83	31.08	1.90	6.56	94.26	3.40	0.123	99.933
0.45	36.05	34.73	1.95	5.96	94.88	3.45	0.104	99.944
0.50	35.21	38.29	2.00	5.40	95.45	3.50	0.087	99.953
0.55	34.29	41.77	2.05	4.88	95.96	3.55	0.073	99.961
0.60	33.32	45.15	2.10	4.40	96.43	3.60	0.061	99.968
0.65	32.30	48.43	2.15	3.96	96.84	3.65	0.051	99.974
0.70	31.23	51.61	2.20	3.55	97.22	3.70	0.042	99.978
0.75	30.11	54.67	2.25	3.17	97.56	3.75	0.035	99.982
0.80	28.97	57.63	2.30	2.83	97.86	3.80	0.029	99.986
0.85	27.80	60.47	2.35	2.52	98.12	3.85	0.024	99.988
0.90	26.61	63.19	2.40	2.24	98.36	3.90	0.020	99.990
0.95	25.41	65.79	2.45	1.98	98.57	3.95	0.016	99.992
1.00	24.20	68.27	2.50	1.75	98.76	4.00	0.013	99.9937
1.05	22.99	70.63	2.55	1.54	98.92	4.05	0.011	99.9949
1.10	21.79	72.87	2.60	1.36	99.07	4.10	0.009	99.9959
1.15	20.59	74.99	2.65	1.19	99.20	4.15	0.007	99.9967
1.20	19.42	76.99	2.70	1.04	99.31	4.20	0.006	99.9973
1.25	18.26	78.87	2.75	0.91	99.40	4.25	0.005	99.9979
1.30	17.14	80.64	2.80	0.79	99.49	4.30	0.004	99.9983
1.35	16.04	82.30	2.85	0.69	99.56	4.35	0.003	99.9986
1.40	14.97	83.85	2.90	0.60	99.63	4.40	0.002	99.9989
1.45	13.94	85.29	2.95	0.51	99.68	4.45	0.002	99.9991