STOR 155, Section 1, Midterm I Tuesday, February 24, 2009

Name: _____

Pledge: I have neither given nor received aid on this examination.

Signature: _____

Instructions: Do <u>not</u> do any actual numerical calculations.	Answers in a form that you would
type into an Excel field, such as "=28*SQRT(82)^2", with	a working answer, are expected.

- 1. The workforce in a has the following breakdown of workers: 10% with a High School education, 70% with High School, but no College, 20% with a College Education. Past experience indicates that workers can perform a given task with success rates: 20% for no H.S., 40% for H.S. no C., 80% for C, education. Find the probability that a randomly chosen worker:
 - a. Can perform the given task.

b. Is College educated if (s)he can perform the given task.

- 2. Our factory buys sheet metal from supplier A, and our long run experience has been that 90% of it meets our specifications. Supplier B claims to have a higher level of quality, so we test 30 of his shipments (that have been randomly sampled), and see that 29 of them meet our specifications. Is it safe to conclude that sheet metal from Supplier B is indeed of higher quality?
 - a. Formulate suitable quantitative hypotheses.
 - b. Calculate a p-value to address this question.

- c. If the numerical answer to part b had been p-value = 0.0051, what would the yes-no conclusion be?
- d. If the numerical answer to part b had been p-value = 0.0051, give a gray level interpretation of the result (in 4 words or less).
- 3. Are the following assignments of probabilities to outcomes legitimate? If not, why not?

a. Roll a die: $P[1] = P[2] = P[3] = P[4] = p[5] = p[6] = \frac{1}{4}$.

b. Draw a card: P[diamond] = 12/52, P[club] = 13/52, P[heart]] = 13/52, P[spade] = 14/52.

4. When undergraduates write a 250 word essay (without spell checking,), the number X of errors has the following distribution:

Value of X	0	1	2	3	4
Probability	0.1	0.2	0.3	0.3	0.1

a. Write the event of "at least two errors" in terms of X, and give its probability.

b. Describe the event $\{X \le 3\}$ in words, and give its probability.

c. If it is known that there is an error, what is the chance of 4 errors?

d. Find $P[X \le 1 \text{ or } X > 3]$.

e. Find $P\{X \le 1 \text{ and } X > 3\}$.

f. Find $P\{X \le 1 \mid X > 3\}$.

- 5. A prisoner rolls a die 3000 times, and observes that the face (out of 6 possible faces) labeled "1" comes up 482 times. Is it safe to conclude that the die is unbalanced?
 - a. Formulate suitable hypotheses.
 - b. Give a P-value for testing these hypotheses.

- c. If the numerical answer to b is: p-value = 0.51, give the yes-no result, and a gray level conclusion (4 words or less).
- 6. About 40% of male internet users, ages 18-28 visit an online auction site, such as eBay once a week. In a survey of 25 such users,
 - a. What is the exact distribution of the number that did not visit such a site last week?
 - b. What is the probability that exactly 16 of the folks in the study had not visited last week?

c. What is the probability that that at least 14 had not visited?