

Math 107 Section I
Montgomery
May 8, 2004

Print Name: _____

Signature: _____

Final Exam

Part I: 50 points

1. Give the negative of the statement below. Use conventional English without phrases like "It is false that..." or "It is not the case that...".

Some scientists believe in creationism.

Answer: _____

2. State in conventional English the contrapositive of the statement "If it's Wednesday, we are not in Belgium."

Answer: _____

3. The logical statement $\neg(p \wedge q)$ is true when (p, q) is

- a) (T, F)
- b) (F, T)
- c) (F, F)
- d) all of the above
- e) none of the above

4. Translate the following statement into symbolic form:

"If I'm in contact with someone who has the flu and I don't wash my hands, then I get sick." Use P, Q, and R as follows:

P: I'm in contact with somebody who has the flu.

Q: I wash my hands.

R: I get sick.

Answer: _____

5. Give the first two rows of the truth table which would be used to decide whether the following symbolic argument is valid or invalid:

$$p \wedge q \rightarrow r$$

$$\neg r$$

$$\therefore \neg p \vee \neg q$$

p q r

T T T

T T F

Part III: 50 points

- Roll a die twice. Which of the following is closest to the probability that the first die is two larger than the second die?
a) .1 b) .3 c) .5 d) .7 e) .9
- A card is drawn from a standard deck. H is the event that it is a heart, and F is the event that it is a 7, 8, 9, or 10 of any suit. Calculate

$$P(H) = \dots \quad P(F) = \dots$$

- With H and F as in problem 2, calculate

$$P(H \cap F) = \dots \quad P(H \cup F) = \dots$$

- With H and F as in problem 2, which of the following is closest to $P(H|F)$?
a) .25 b) .30 c) .35 d) .40 e) .45
- Are H and F independent events? Explain.

- A person is chosen at random from a population. S is the event that the person has been given a flu shot, and F is the event that the person will catch the flu. The probability that a person has had a flu shot is .35 and given that a person has had a flu shot, the probability of catching the flu is .10. Which of the following is closest to the probability that a person both had a flu shot and will catch the flu?
a) .1 b) .3 c) .5 d) .7 e) .9

- In a jar there are 50 marbles; 41 are white and 9 are black. Without looking you choose 7 marbles. What is the probability that exactly 5 are black?

$$\text{a) } \frac{{}_{20}C_5 \cdot {}_{30}C_2}{{}_{50}C_7} \quad \text{b) } \frac{{}_{9}C_5}{{}_{50}C_7} \quad \text{c) } \frac{{}_{20}C_2 \cdot {}_{30}C_5}{{}_{50}C_7} \quad \text{d) } \frac{{}_{9}C_2 \cdot {}_{41}C_5}{{}_{50}C_7} \quad \text{e) } \frac{{}_{30}C_2 \cdot {}_{20}C_5}{{}_{50}C_7}$$

Part IV: 50 Points

- College students eating breakfast at Bagelz were asked how many cups of coffee per day they drank. The table below summarizes the results (x is the number of cups of coffee per day, and f is the frequency of the value). Which of the following is closest to the standard deviation of this data?
a) 1.25 b) 1.50 c) 1.75 d) 2.0 e) 2.25

x	f
0	3
1	0
2	10
3	2
4	10

2. Mary's first three tests averaged 75% and her last two averaged 85%. Which of the following is closest to her overall average?

- a) 78 b) 79 c) 80 d) 81 e) 82

3. The set of data below has a mean of 3 and a standard deviation of 1.84. Which of the following is closest to the proportion of the data lying within one standard deviation from the mean?

- a) .30 b) .40 c) .50 d) .60 e) .70

X	f
1	3
2	6
3	0
4	6
5	3

4. The picture below is a relative frequency histogram for which set of data?

- a) {1, 2, 2, 2, 2} b) {1, 1, 2, 2, 2} c) {1, 1, 1, 2, 2} d) {1, 1, 1, 1, 2} e) None of those

5. A national test given to high school students has a mean of 500 and a standard deviation of 100. The scores are distributed normally. Which of the following is closest to the proportion of students scoring below 550 on this exam?

- a) .40 b) .50 c) .60 d) .70 e) .80

6. For the test in #6, which of the following is closest to the score you need to achieve in order to be in the top 10%?

- a) 550 b) 575 c) 600 d) 625 e) 650

7. A sample of 900 patients were given a flu vaccine. 7% of these patients subsequently caught the flu. Which of the following is closest to the margin of error for this experiment using a 95% confidence level?

- a) 1.0% b) 1.5% c) 2.0% d) 2.5% e) 3%

8. What statement can be made about the effectiveness of the vaccine on the overall population? The statement should include the margin of error and the confidence level. Write out the statement below.