

SOLUTIONS! MATH 118, SECTION A1 &A2

Final, December 10, 2001

For full credit, show all work. Each question is 10 points, and the test is graded out of 150 points.

There are some who call me....:

1. Scooby, Scrappy, Shaggy, Velma, Daphne, and Fred need to elect two members to go looking for the ghost in the haunted house. How many ways is it possible to do this?
 $6 \text{ choose } 2 = 6!/(2!4!) = 15.$

2. Give an example of a personal attack or false cause fallacy. (Be sure to identify which one you use.)

False cause: We jinxed my little brother and he took a chunk out of his nose with the handlebars of his scooter.

Personal Attack: Colorado would be in the Rose Bowl, but a bunch of computer geeks don't know what they're doing.

3. Batman put \$1000 in the bank at 2% interest, compounded monthly. Ninjabat put \$950 at 3% compounded yearly. Who has more money after 5 years?

Batman: \$1105.08

Ninjabat: \$1101.31

Batman has more money.

4. "Road trip!" The distance between Halifax, Nova Scotia and Saskatoon, Saskatchewan is about 4277 km. What is the distance in miles if 1 mile is 1610 meters?

$4277/1.61 = 2657$ miles.

5. You can afford \$600 a month in car payments for the next 3 years. Swifty Loan Company will give you a 7% APR loan over this term. What is the most expensive car you can buy?

\$19432

6. You currently make \$38,000 a year. Your boss promises to give you a 15% pay raise in a year if you take a 12% pay cut now to save the company some money in these difficult financial times. Will you be making more or less money after the raise?

$\$38000(1-.12)(1+.15) = \38456 : more.

7. The amount of time spent studying for the Math 118 final is normally distributed with a mean of 46 hours, with a standard deviation of 15. What percentage of people studied an hour or less? What percentage studied between 31 and 76 hours?
- 2.5% studied an hour or less.
81.5% studied between 31 and 76 hours.

8. The lengths of time you have parked illegally and avoided the campus parking nazis are: 15, 12, 6, 3, 7, 11, 32, and 6. What are the mean, median, and mode of this data? What is the standard deviation?

mean: 11.5 minutes
median: 9 minutes
mode: 6 minutes
std. dev.: ≈ 9.15 minutes

9. If you add a joker to a standard deck of playing cards what is the probability of getting five of a kind if the joker is wild?

number of hands: $53 \text{ choose } 5 = 2869685$

number of ways to get 5 of a kind: 13.

probability: $13/2869685$

10. A friend asks you to play the following game: He will give you \$10 if you toss three heads in a row with a fair coin, and he will take \$1 if you don't. Does it make sense (in terms of expected value) to play this game.

Expected value: $\$10(1/8) - \$1(7/8) = \$(3/8)$

Yes, it does make sense.

11. Of 10,000 people polled, 12% have heard of Five Iron Frenzy, and 75% of those like them. How many people polled like Five Iron Frenzy?

$$(10,000)(.12)(.75) = 900$$

12. Choose one of the following:

i) "We choose to go to the moon!" The distance from Cape Canaveral to Mare Tranquilatis is about 250,000 miles. What is that in scientific notation?

ii) people ranked their favorite Star Trek series as follows (where O = Original Series, N = Next Generation, D = Deep Space Nine, V = Voyager, and E = Enterprise). What series is considered the winner using the Borda count method?

1st	O	N	E	D
2nd	N	D	O	V
3rd	D	E	V	N
4th	V	V	D	O
5th	E	O	N	E
num	12	15	7	3

i) $2.5 * 10^5$ miles

ii) Next Generation.

13. The Fibonacci rabbit family grows at a rate of 62% per month. If there are initially 2 rabbits, how long does it take the population to double? What is the size of the population after a year?

$$T_{double} = 1.44 \text{ months}$$

$$\text{size of population: } 2(2)^{12/1.44} = 653$$

14. The number of people in the music listening population who like Limp Bizkit was 3 million at the height of their popularity two years ago. The half-life of the number in their following is 3 months. How many are devoted fans today?

$$(3,000,000)(1/2)^{24/3} = 11,719$$

15. "I attack Kamchatka from Yakutsk!" In the game of Risk, the defender rolls one die and the attacker rolls 3 dice. The attacker wins if he rolls a number higher than (but not equal to) the defender on at least one of his three dice. If the defender rolls a 5, what is the probability of the attacker winning?

$$P(\text{win}) = 1 - P(\text{lose}) = 1 - (5/6)^3 = 1 - 125/216 = 91/216 \text{ (42 \% chance).}$$

BONUS! (+3 points) Answer 1, 2, and at least one part of 3. Feel free to be humorous in your response.

1. What is your name? Eric Landquist
2. What is your quest? I seek the Grail! Be a cryptogeek. Wait, I am one. Um, be a Dr. cryptogeek.
3. a) What is your favorite color? Blue, no yel-AAAAAAHHH! Burnt orange and Chicago maroon. I actually bleed those colors.
b) What is the capitol of Assyria? I don't know that. AAAAAAAH! Nineveh.
c) What is the air-speed velocity of an unladen swallow? What do you mean, an African swallow or a European swallow? I don't know AAAAAAAHHH!
d) What bowl is Illinois going to? Sugar Bowl!
e) What would you do if the discrete logarithm problem on an elliptic curve was solvable in subexponential time? Tell the NSA, get my doctorate, and win a bunch of code cracking contest.
f) What is your instructor's favorite number? $\frac{1+\sqrt{5}}{2}$
g) What is your favorite number? $\frac{1+\sqrt{5}}{2}$
h) What is a question you think you can stump you instructor with? Find an algorithm to compute the discrete log of an elliptic curve over a field of prime order in subexponential time.
i) What band got its start in Illinois and got its name from a verse in 2 Corinthians chapter 4? Jars of Clay
j) Who is better, Elmo or Grover? Elmo.
k) Who would win in a fight between Justin Timberlake and Britney Spears? Britney's python?
l) How ridiculous do you think these questions are? Quite. FFFFFFF-BOOM! ;clap, clap, clap;
m) Prove that $x^n + y^n = z^n$ has no positive integer solutions for $n > 2$. The proof won't fit in the margin.
n) Are you pondering what I'm pondering? I think so, Brain, but do you really think we'll need a topographical map in Illinois?
o) What largely overlooked band from the 70s (which recently achieved critical acclaim for a 2000 release) was comprised of Walter Becker and Donald Fagen? I forgot.
p) Can you tell me where they got the name for their band? (This one's worth a million points and your TA's undying respect and admiration.)

Some book as obscure as the band itself.

- q) Who wrote our textbook? Bennett and Briggs
 - r) What was the best independent film released last year? Pi.
 - s) What was the best movie of the 80's? Goonies
 - t) Who is Rupert Murdoch? A Loch-Ness Monster chaser?
 - u) What is the longest interstate highway? I-90 Seattle to Boston
 - v) Why are there interstate highways in Hawaii? Because someone built them.
 - w) What is your favorite group of order 8? D_8
 - x) Did General Quintic serve in the Gulf War? nope
 - y) Who would make a better cannonball dive: Chunk or Fat Albert? Close call. I'd say Chunk, though, since humans are 3-dimensional while cartoons are only 2-dimensional.
 - z) What was your favorite math class this semester? Math 118 and Cryptographic Algorithms
- Happy Hanukkah and Merry Christmas! Enjoy the break!