Math 101
Final Review Sheet

Instructions: Bring to the test a pencil, an eraser, and a non-graphing calculator. Do not bring any notes or formula sheets. You will not be allowed to look any anyone else's paper. Each problem will be worth 15 points, so you *can* get extra credit on this test if you do very well! **Our Final Exam will be on Monday, April 24, from 10:00 am to 12:30 pm, in our regular classroom.**

1) Construct a truth table for the symbolic expression $(p \vee \sim p) \to q$

2) Use DeMorgan's laws to write the negation of the statement: "I am not a penguin and I am not a Californian."

3) Assign letters to each basic statement in this sentence, and translate into logic symbols: "If I take the train or take a bus, then I will be bored and I will be late." Be sure to place parentheses properly.

4) Use a truth table to determine if this syllogism is valid:
 a) If I build it, people will come visit
 b) If people don't come visit, my farm will fail
 Therefore, if I don't build it, my farm will fail

5) Determine the most obvious valid conclusion that goes with these two premises: **a)** If I eat a raisin, then I will get a rash
 b) I didn't get a rash

6) The average home price in Modesto is currently about $180,000. The average home loan interest rate is 4.05%. The average home loan is for 30 years. What is the average home loan monthly payment?

7) If I put away $300 a month for retirement, earning 6% interest, how much is this ordinary annuity going to be worth when I am 65 years old (in 20 years)? Round to the nearest penny.

8) If I want to set up an annuity to be worth $500,000 in 35 years, how much does the monthly payment need to be, if I can get 8.5% interest? Round to the nearest penny.

9) I use a time machine to take my life's savings ($130,000) back to make a deposit in the very first US bank (founded in 1791). If we assume that my money is going to make an average of 5.5% interest, compounded monthly, how much will the money be worth when I return to this year? Round to the nearest ten thousand dollars.

10) A bank offers 7.5% interest, compounded *daily*. What would the annual yield be? If the interest was compounded *monthly*, what would the annual yield be? Round both answers to the nearest thousandth of a percent.
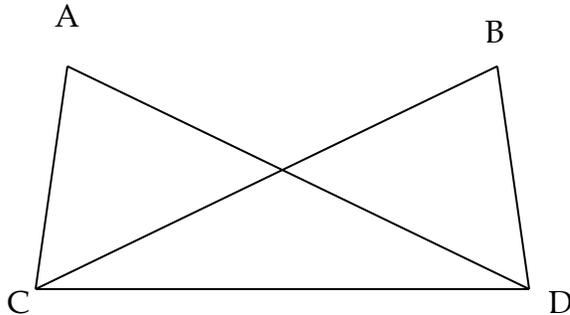
11) State Euclid's 5 axioms for geometry.

12) Use the two column method to prove the following result:

Given: $\angle ACD = \angle BDC$

$\angle ADC = \angle BCD$

Prove: $\angle A = \angle B$

A

B

C

D

13) Standing 65 feet from a flagpole, you measure the angle of elevation to the top to be 52°. Assuming your eyes are 5 feet above the ground, how tall is the flagpole to the nearest foot?

14) While drawing a large triangle in the rolling hills of Bormaria, you discover that the angles add up to 178°. What can you say about the parallel postulate in Bormaria?

15) A recital hall, shaped like an ellipse, is 150 feet long and 80 feet wide. How far from the center are the foci, to the nearest <u>inch</u>?

16) Convert $CG49_{17}$ into base 10

17) Convert 60,521 into base 12

18) Create a multiplication table for the single digit numbers in base 12

19) A "prime desert" is a collection of consecutive non-primes. For example, 24, 25, 26, 27, and 28 are all composite numbers. This is the first prime desert with 5 numbers in it. Find the first prime desert with 7 numbers in it.

20) A "Ripon Number" is a *prime* number which has the property that the *sum of the squares* of its digits is *also prime.* For example, 23 is a Ripon Number because it is prime and $2^2 + 3^2 = 13$, which is also prime. Also, 17 is not a Ripon Number because $1^2 + 7^2 = 50$ isn't prime, and 32 isn't a Ripon Number because it isn't prime in the first place. Find the first three Ripon Numbers.

21) What one thing are you most proud of learning in this class? (You can't really get this question wrong, as long as you write something that shows that you thought about it!)