Math 113: Exam 1

Name: _____

Wednesday, January 28, 2008

Directions: Answer every question. Show appropriate work and justify your answers.

1. Every UT student needs to take one public speaking course (the OC requirement) in order to graduate. If UT wants every student to have a shot at graduating in four years, how many sections of courses on the OC list should be offered each semester?

2. Fill in this Sieve of Eratosthenes to find the prime numbers up to 50

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	34	44	45	46	47	48	49	50

   Prime numbers up to 50:

3. A business tracks its employees' time and attendance with their employee IDs. When they arrive at work, they swipe their IDs through a card-reader, and the system records what time they arrive, to the nearest minute. If this business has 40 employees and they all report to work between 8:30am and 9:00am, must there be two people who have the same arrival time?

4. List five strategies that you could use to start trying to solve an unfamiliar math problem.

5. In August of 2008, the Great Internet Mercenne Prime Search discoverd that the number $2^{43112609} - 1$ (which has about 12.9 million digits) is a prime number. Give a convincing mathematical reason (in detail) why there must be a prime number that is bigger than $2^{43112609} - 1$.

6. This problem is about the **Twin Prime Conjecture**

   (a) State the Twin Prime Conjecture.

   (b) Give an example of some pairs of twin primes.

7. (a) Write 51 as the sum of Fibonacci numbers.

   (b) Write 51 as the product of prime numbers.

8. Explain in detail why it is impossible to write the number 11 as the sum of two prime numbers.

9. Give an example of somewhere other than math class or a math book where you might encounter the Fibonacci numbers.

10. Stools have three legs, and chairs have four legs. If there are 100 seats and 320 legs, how many chairs and how many stools are there?

11. Find the remainder as a whole number (no decimals!):

    (a) $6543 \div 22$

    (b) $((1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 \times 13 \times 14 \times 15 \times 16 \times 17 \times 18 \times 19 \times 20 \times 21 \times 22 \times 23 \times 24 \times 25 \times 26 \times 27 \times 28 \times 29 \times 30 \times 31 \times 32 \times 33 \times 34 \times 35 \times 36 \times 37 \times 38) + 1) \div 11$

12. Find the value of each expression:

    (a) F_6

    (b) $\dfrac{F_{10}}{F_9}$

    (c) $F_7 + F_{3+2} + 8$