

Name: _____

MATH 113 – EXAM 1
12 September 2005.

Directions: Answer every question. Show all work and justify your answers. If you need more space, use the back of the exam pages. Each question is worth five points.

Reminder: The notation F_n stands for “the n^{th} Fibonacci number.”

1. Mark the grid of numbers as follows:

- Cross out the number 1
- Circle the number 2. Cross out all the multiples of 2 (like 4, 6, 8, 10, ...).
- Circle the number 3. Cross out all the multiples of 3 (like 6, 9, 12, 15, ...).
- Circle the next number that hasn't been crossed out yet. Cross out all its multiples.
- Keep repeating the previous step until every number has been circled or crossed out.

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

What do all the circled numbers have in common?

2. You have a 7 oz. glass, a 9 oz. glass, and an large supply of water. Neither glass has any markings on it, and both are oddly shaped, making estimation impossible. How would you measure exactly 4 oz. of water?

8. (a) Find the value of $\frac{F_6}{F_5}$.

(b) What happens to the ratio $\frac{F_{n+1}}{F_n}$ as n gets large?

9. Use what we've learned about the number $(1 \times 2 \times 3 \times \cdots \times 1000) + 1$ to convince me that there *must* be a prime number bigger than 1000. (You should be able to answer this in just a few sentences.)

10. (a) Write the number 90 as the product of prime numbers.

(b) Explain why you are certain that 71 is a prime number.

