

Math 113: Exam 1

Monday, January 28, 2008

Name: _____

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

1. Let the notation F_n mean "the n th Fibonacci number."

(a) Find the value of $\sqrt{\frac{F_3}{F_1}}$ and $\sqrt{\frac{F_4}{F_2}}$.

(b) Look for a pattern to make a guess what happens to $\sqrt{\frac{F_{n+2}}{F_n}}$ as n becomes large.

2. (a) Write the number 40 as the **sum of two prime numbers**

(b) Write the number 40 as the **product of prime numbers**

(c) Write the number 40 as the **sum of Fibonacci numbers**

3. What is the Golden Ratio? Give its exact value and its decimal approximation.

4. State the Pigeonhole Principle in your own words.
5. Consider the number $N = (1 \times 2 \times 3 \times 4 \times 5 \times 6 \times \cdots \times 48 \times 49 \times 50) + 1$
- (a) Is this number even? Why or why not?
- (b) What can you say about the size of the prime factors of N ?
6. You are organizing a tournament with eight teams. Each team has to play each other team exactly one. How many games will be played?

7. Determine whether each of the following numbers are prime. If the number is prime, write **prime**. If the number is not prime, explain why it is not prime.

(a) 247

(b) -7

(c) 97

(d) 2

(e) $\frac{5}{7}$

8. Estimate the growth rate of human hair in miles per hour. There are 12 inches in a foot and 5280 feet in a mile.

9. How many people do you need to have in the same room to be absolutely sure that there are three of them with the same birthday? (In honor of 2008 being a leap year, let there be 366 days in a year.)

