

### MAED 548 A few non-routine problems to consider

1. What is the maximum number of slices of pizza you can get with 5 cuts? With 10 cuts? With 100 cuts? Find a function  $f(n)$  which returns the maximum number of slices for  $n$  cuts.
2. 256 basketball teams play in a single elimination tournament. How many games must be played to determine a winner?
3. The host at a party said, "I have three daughters and I will tell you how old they are. The product of their ages is 72. The sum of their ages is my house number. How old is each daughter?" A guest rushed to the door, looked at the house number, and told the host that he needed more information. The host then said, "The oldest likes strawberry pudding." The guest then announced their ages. How old was each daughter?
4. A man drives from Rock Hill to Columbia at an average rate of 40 mph. He drives the same route back at a rate of 60 mph. What is the average rate for the entire trip?

5. Evaluate:

$$x^5 + \frac{1}{x^5} \text{ when } x^2 + \frac{1}{x^2} = 7$$

6. Assume you tie a ribbon around the circumference of earth so that there is no slack. You then cut the ribbon and insert a 6 foot long section of ribbon. If the ribbon is then suspended above the surface of the earth such that it is the same height off the surface at all points, how far above the surface is the ribbon? Assume the earth is perfectly round with a circumference of 132,000,000 feet.

Carry out the same procedure for a basketball with a circumference of three feet. How far off the surface of the basketball is the ribbon after the 6 foot length of ribbon is inserted?

7. At a new senior highschool, there are exactly 1000 lockers and 1000 students. The lockers are numbered from 1 to 1000. On April Fool's Day, the students played the following practical joke:

The first student entered the building and opened all the lockers.

The second student closed every locker with an even number.

The third student changed the position of every third locker (if open he shut it, if closed he opened it).

The fourth student changed every fourth locker.

This continued through the 1000th student. After the 1000th student passed through the locker area, was locker #761 open or closed?