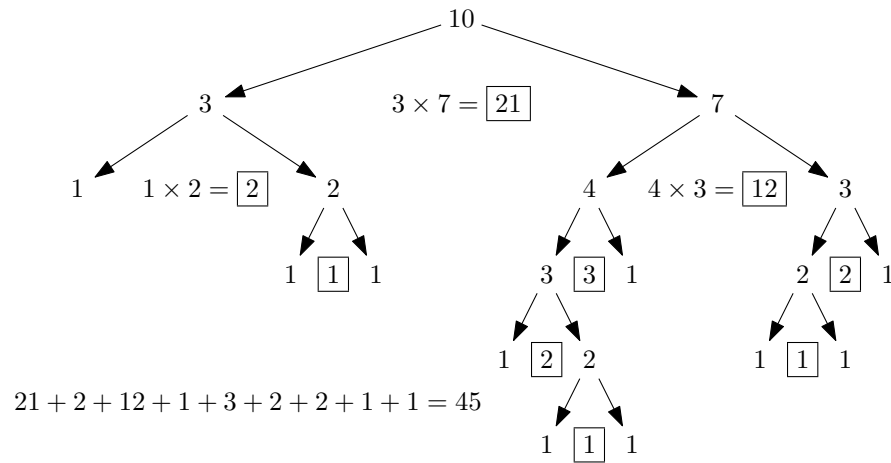


CPSC 320: TUTORIAL 2

- Suppose you play the following game. You start with a pile of n stones. You divide the stones into two smaller piles. If the two smaller piles are of size a and b , you write down the product ab and repeat this process on any pile with more than one stone. Eventually, you produce n piles each with one stone. The sum of the numbers you write down is your score. What strategy should you follow to maximize your score? Hint: Try small examples. You should see a pattern. Prove it by induction.

Here's a big example with 10 stones:



- Analyze the running time of the following algorithm as a function of n , assuming that each arithmetic operation and comparison takes constant time. Use Θ notation to express your result as simply as possible. Give an informal argument (not necessarily a full proof) to support your answer.

```

Foo(n)
  i = 0
  sum = 0
  while (sum < n)
    i = i + 1
    sum = sum + i
  return i
    
```

3. Suppose someone draws n (infinitely long) lines on a piece of (infinitely big) paper. The lines divide the paper into regions. Describe an algorithm that colors the regions either black or white so that no two regions with a common boundary are the same color. The following is an example of a good coloring. Hint: Use an input consuming idea.

