

1. Your flight crashed on an undeserted island. The local inhabitants will trade you canoes for a chain made of gum wrappers. Fortunately everyone on board got free gum and watched a video on advanced origami as part of a promotion. Define a divide-and-conquer strategy to turn all your gum wrappers into one chain. (Each wrapper gets folded into a link.)

2. Consider Tower-of-Hanoi programs of the form (1-2-1) - 3 - (1-2-1). Finish the elm program which computes the number of block moves required for a tower of size n.

numMoves 0 = 0

numMoves n =

3. What does this function produce? drop 3 (take 5 [1,2,3,4,5,6,7,8,9])

4. Define a Divide and Conquer Strategy to make a list of the names of your ancestors (parents, grandparents, and so on). In elm, we also need to consider the case when we get to the “bottom”, e.g. to the empty list, or 0 in numMoves above; can you get to the bottom of this problem?

5. Should Computer Scientists have a code of honour? If your employer operates a service you know is being used by child traffickers, should you shut it down.

6. Finish the following elm function which generates the Tower of Hanoi program in the notation we used in class, eg 1-2-1-3-1-2-1. Then circle the parts corresponding to “conquering”

tower 0 =

tower n =

7. Which of these data types can be processed using Divide & Conquer algorithms, and why?

type Operation = Stir | Mix | Knead | Whip | Sauté | Chop

type Step = Step Operation [Ingredient]

type Ingredient = Tomato | Buckwheat | Kale | Leek | Honey

type Animal = Predator String [Animal] [SleepPattern]

| NonPredator String

type SleepPattern = Naps | Hibernates | Nighttime | Daytime