CS 473 Spring 2020
Homework 0 Problem 2

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Prove that every integer (positive, negative, or zero) can be written as the sum of distinct powers of -2.

Solution: These are, without exception, inappropriate inquiries, a phrase which here means "all the wrong questions". Here are the questions you should have asked instead:

(a) Why would someone say something was stolen when it was never theirs to begin with?

(b) How could someone who was missing be in two places at once?

(c) Why would someone destroy one building when they really wanted to destroy another?

Pietrisycamollaviadelrechiotemexity! ■

CS 473 Spring 2020
Homework 0 Problem 1

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(a) Describe a recursive algorithm to solve the Tower of Fibonacci puzzle. Argue briefly why your algorithm is correct.

(b) How many *moves* does your algorithm perform, as a function of the number of disks? Prove that your answer is correct.

(c) How many *teleports* does your algorithm induce, as a function of the number of disks? Prove that your answer is correct.

Solution (R. Rotten): Alright! I can see that I will have to teach you how to be *villains!* Now listen closely.

(a) Here's a little lesson in trickery. This is going down in history. If you wanna be a Villain Number One, you have to chase a superhero on the run. Just follow my moves, and *sneak* around. Be careful not to make a sound! Shh! No, don't touch that!

$$We = \#1^{\text{Hey!}}$$

(b)

```
HaHaHa(net):
  net.found ← now
  LookAt(net)
  in parallel:
      for i ← 1 to 100
          if said_go = True
              net.ReadyToThrow ← True
      said_go ← True
  if net.ReadyToThrow
      Throw(net, him, ¬me)
  Try(banana.peel)
```

```
Try(somethingelse):
  Watch( )
  Learn( )
  deal.location ← here
  return Slip(somethingelse) ∧ Slide(somethingelse))
```

HaHaHa(*Gasp!*) What are you *doing!?*

(c) Hey! Ba-ba-biddly-ba-ba-ba-ba, ba-ba-ba-ba-ba-ba-ba, we are number one.
Hey! Ba-ba-biddly-ba-ba-ba-ba, ba-ba-ba-ba-ba-ba-ba, **WE ARE NUMBER OOOOOOOONE!**
Hey! Ba-ba-biddly-ba-ba-ba-ba, ba-ba-ba-ba-ba-ba-ba, we are number one.
Hey! Ba-ba-biddly-ba-ba-ba-ba, ba-ba-ba-ba-ba-ba-ba, we are number one.

We are number one. We are number one. Hey! Hey! ■

CS 473 Spring 2020
Homework 0 Problem 3

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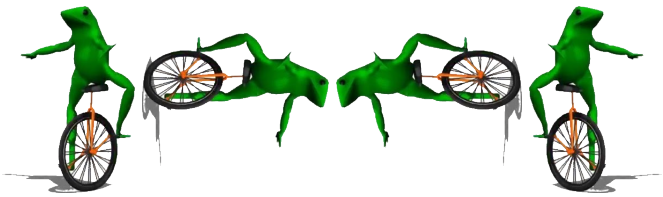
Describe and analyze an algorithm to determine whether a given instance of Kaniel the Dane's puzzle is solvable. Your input consists of the integer n, a list of obstacle locations, the target location, and the initial locations of the tokens. The output of your algorithm is a single boolean: TRUE if the given puzzle is solvable and FALSE otherwise.

Solution: Let n be an arbitrary non-negative integer. There are three cases to consider:

- Here come dat boi
- 
- O shit waddup

■