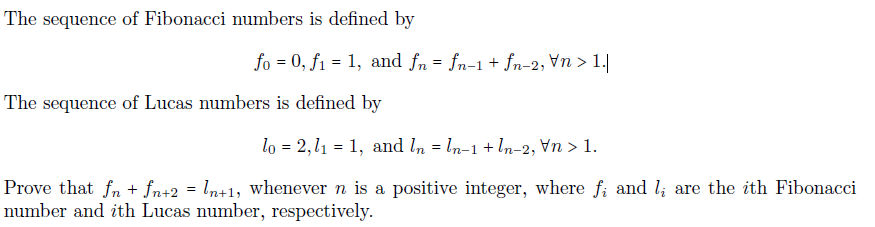
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| **COMP-232**  **MATHEMATICS FOR COMPUTER SCIENCE Fall 2019**  Assignment #4  **Shadi Jiha**  **#** **40131284** |

**PROBLEM 2:**

*Basic step:*

Let

So, it is true for n = 2

Let n = 3

So, it is true for n = 3

*Inductive step:*

Assume that is true for , where

Now for

We can still decompose them further:

Now replace with :

By the induction hypothetic is this true because for being . And the statement above every and is not greater than .

**Problem 4:**

Equivalence relation ?

* Reflexive?
  + Case :

which is true.

* + Case :

which is also true.

* + Case :

which is also true

So is reflexive.

* Symmetric? Must satisfy,
  + Case :

Let . .Then:

Which is true

* + Case :

Let . .Then:

Which is true

* + Case :

Let . .Then:

Which is true

* Transitive? Must satisfy,
  + Case are rational numbers:
    - . Then:

These are all true because rational number – rational number = rational number, which satisfies the initial equation. Also,

* + Case are irrational numbers:

These are all false because irrational number – irrational number = irrational number, which doesn’t satisfy the initial equation (irrational number ).

So, it is not transitive. And thus, it is not an equivalence relation.

**Problem 5:**

c) Suppose we have a set . Then and

So . Hence the statement is true, because if R and S are both reflexive on A, they both need to have for each element . And since we want R – S, we removing all the common elements which sure will be all the reflexive elements because they exist in both R and S.

**Problem 6:**

**Problem 7:**

**Problem 8:**

Let’s take the example form problem 7. is transitive closure of on

1. The reflexive closure of S:
2. The symmetric closure of is an empty set so it is not an equivalent relation.