**Exam2**

**Exercise 1**: Construct the table of addition of (Integers modulo 5)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 |  |
| 0 | 0 | 0 | 0 | 0 | 0 |  |
| 1 | 0 | 1 | 2 | 3 | 4 |  |
| 2 | 0 | 2 | 4 | 1 | 3 |  |
| 3 | 0 | 3 | 1 | 4 | 2 |  |
| 4 | 0 | 4 | 3 | 2 | 1 |  |
|  |  |  |  |  |  |  |
|  |  | | | | | |

**Exercise 2:** Let X be the set defined as

X is a partially ordered set under the relation.

a)Draw the Hasse diagram for this partial ordering.

(took and submitted picture of drawing on paper)

b)Name all the minimal and maximal elements if they exist.

Minimal b maximal elements is bears

c)Name a pair of incomparable elements if any exist.

They are all compatible as all have the similar number shared as b, there is a match where b is part of the “a,r” set, int the set a,r,b and that would be the only set it wouldn’t be similar to

**Exercise3**:

Show by using induction that

Base case 1 cubed = (1/2\*1(2))squared

(½\*2)squared

1 squared= 1

Base case is true

Induction= assume that k-1 is turs

½(k-1)(k)squared

= k cubed

K cubed- k = k squared

K(1/2k squead-2k-1= (½ k(k+1) squared

Statement k is true

Statement n is true for all n (greater then or equal to) 1

**Exercise 4**: Consider the recurrence relation

Prove by induction that

for

Staetmrent one, base cae

3\*1(squared)-3(1)=1= 1

9-(3\*1)+1

9-3+= 7

Base cae is not true, thus cannot prove using induction

**Exercise5**: Define a set recursively as follows

B: 5

R : if then

R2: If then

Show by induction that every element of is divisible by 5.

Because 5I5 base is true

Inductive steep

Assueme that 5Ix

5Ix= x= 5k k is an integer

X+10 = 5k+ 10= 5(k+2)

5 I x+10

X squared = (5k) squared =25 k squared = 5n\

5 I x squared

All elements of x are multiples of 5

**Exercise 6**: Let be an Slist.

Define a recursive function as follows:

B. Suppose . Then

R. Suppose . Then

Compute showing all the steps.

2,3= xy

7,9= x,y

Flip (2,3), flip (7,9)

(3,2), (7,9)== (y,x)

**Exercise7**: Let be an Slist

1. Compute Search [70,L], Showing all steps.

[70((15,25),(35,45))] [70((50,60),(70,80))]

False V false V false V false V false V false V true V false

1. Compute BSearch[70,L] , showing all steps

Bsearch [70((50,60),(70,80))]

Bsearch [70((70,80))]

Bsearch [70, 70]

= true