UNIT 8

# Binary Operations

* Not too hard to understand. You’re basically doing an operation on TWO things
* “Bi” means two.
* These operations can be done on numbers, elements, sets, powersets.
* So instead of writing something like +(3,5) = 8, we can also write 3 + 5 = 8
* Denoted by f where f is the name of the binary operation:

f:B x B B

## Associative Binary Operation

*Perform operation regardless of how terms are grouped*

♢ : , is associative (x ♢ y) ♢ z = x ♢ (y ♢ z)

## Commutative Binary Operation

*Order of terms does not matter*

♢ : , is commutative x ♢ y = y ♢ x

## Identity element Operation

*An operation that causes sets to equal themselves*

♢ : , iff e ♢ x = x ♢ e

# Operations on Vectors

* Vectors are like arrays in C++.
* N-ary relations are vectors too.
* Since vectors hold “sensitive” information, you have to be careful how you do operations on them.

Example

Imagine you have the sum (x + y + z). If you want to do operations on this sum you can either do them on each of the numbers inside or you can do an operation on the whole vector which affects each number

Same number of co-ordinates

Vector U

Vector V

U + V

Product of scalars (product with some sort of operation)

(, )

R(, )

Scalar R

Vector U

Dot Product / Inner Product

(, )

Vector U

Vector V

# Matrices

* Extension of vectors. In tabular format.It’s just a new way of writing down data.
* We call them m x n matrices, where m is the number of rows and n is the number of columns
* Operations on them isn’t difficult.
* For addition, we can only add where the m and n values are the same
* For multiplication, we can do it where m1 = n2 and m2 = n1. So basically the second matrix is the same as the first if it were tilted on the side.

*Look in your book at how you answered assignment 3 question 10*

Example – Multiply these

3 by 2 Matrix 2 by 2 Matrix

(2,1).(1,4)….

x = =

Hint, use <http://www.calcul.com/category:/math/matrix/multiplication> **for a calculator**

