**Problem-1:**

**TOPIC: B(X,Y):**

B(x,y) denotes the set of all bounded linear operators from X to Y.

Bounded operators show that the function that is related to the other function which may have the same co-domain as the domain.

The bounded operators are functions which are declared over the linear space.

Bounded linear operator is a linear transformation between the normed vector spaces x, y for which the ratio of norm of L(v) to that of v is bounded above by the same number, over all non-zero vectors in X.

*T*:*X*→*Y* is said to be a linear operator from *X* to *Y* if it satisfies the following properties:

1. *T*(*x*+*y*)=*T*(*x*)+*T*(*y*) for all *x*,*y*∈*X*
2. *T*(*λx*)=*λT*(*x*) for all *x*∈*X* and for all *λ*∈R (or C)

**Domain:**

Here the domain of the function depends on the value of x in B(X,Y), where x is the operand or the equation on which the operation is performed.

**Co-Domain:**

Here the co-domain of the function depends on the value of y (y = T ||x||). Here the T||x|| shows the operator and the final solution space of the given operand x. (**T** is the value of operand on which the operator function can be performed).

The domains(x) and the co-domains (y or T||x||) are provided at run-time when the operations are declared.

**Example:**  Let *X* and *Y* be normed linear spaces. We define the operation of **Addition of Bounded Linear Operators** for all *S*,*T*∈B(*X*,*Y*) by (*S*+*T*)(*x*)=*S*(*x*)+*T*(*x*) for all *x*∈*X*. We define the operator of **Scalar Multiplication of Bounded Linear Operators** for all *T*∈B(*X*,*Y*) and for all *λ*∈C by (*λT*)(*x*)=*λT*(*x*).

**Formulas:**

1. ||T(x)|| <= ||T|| . ||x||
2. ||T|| = sup ∥*T*(*x*)∥/∥*x*∥

**References:**

1. <http://mathonline.wikidot.com/the-normed-linear-space-b-x-y>
2. <https://en.wikipedia.org/wiki/Bounded_operator>