SOLVING INEQUALITIES

Solving $A \cdot X + B < C$.

- *A, B, C. X* will be a continuous fuzzy number
- In the crisp case
  ax+b<=c
- *let E =A· X+ B*

- We write *N = (a/b/c)* for a triangular fuzzy number.
- We write *T = (a/b, c/d)* for a trapezoidal fuzzy number.

Example

- Let *A* = (2/4/5), *B* = (-6/- 3/ - 1) and *C* = (10/14/15).

Answer

Since *A* > 0
let us start with assuming *X ≈(x1/x2,x3 /x4),*
X > 0.

- The a-cuts are
  A[α]= [2 + 2α, 5- α],
  B[α] = [-6 + 3α, -1- 2α],
  C[α] = [10 + 4α, 15- α]
- ,
  X[a] = [x1 (α),x2(α)].

- E[α] =
  [(2 + 2α)x1 (α) + (-6 + 3α),
  (5- α)x2 (α) + (-1 - 2α)].

- We first define < between fuzzy numbers *M* and *N*. Let *v(M* <= N) = sup{min(M(x),N(y))lx <= y}, which measures how much *N* is less than or equal *to M.* We write *N* < *M* if *v(N* <= M) = 1 but *v(M* <=; N) < ?, where ? is some fixed fraction in (0, 1]. Let us use ? = 0.8 in this book. Then *N* < *M* if *v(N* <= M) = 1 and *v(M* <= N) < 0.8. We define *M* ≈ *N* when both *M* <N and *N* <M are false. *M* <= *N* means *M* <N or M≈ *N.*

- (2 + 2α). x1(α)+ (-6 + 3 α) ≤ 10 + 4 α,
- (5- α)x2(α) + (-1- 2 α)≤ 15- α
- $x1(\alpha) \leq \frac{16+\alpha}{2+2\alpha}$
- X2(α)≤ $\frac{16+\alpha}{5-\alpha}$

Since

- $dx1/d\alpha > 0$,
- $dx2/d\ \alpha < 0$
- $x1(1) \leq x2(1)$