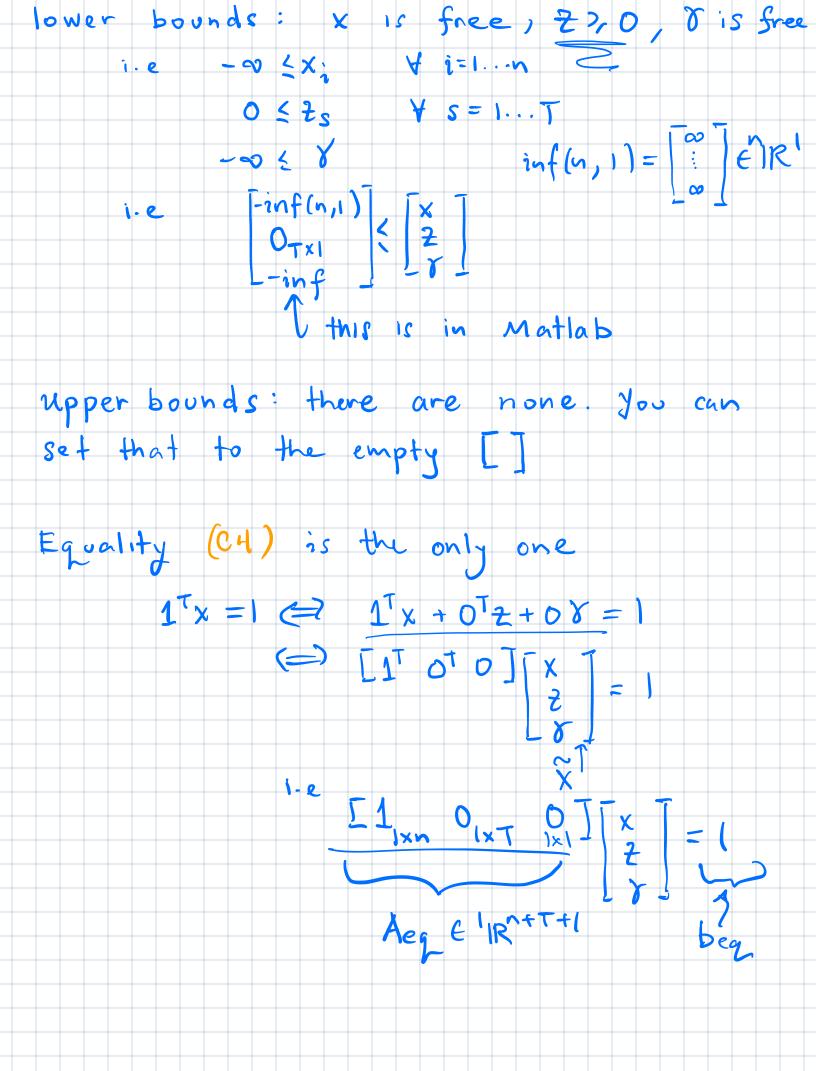
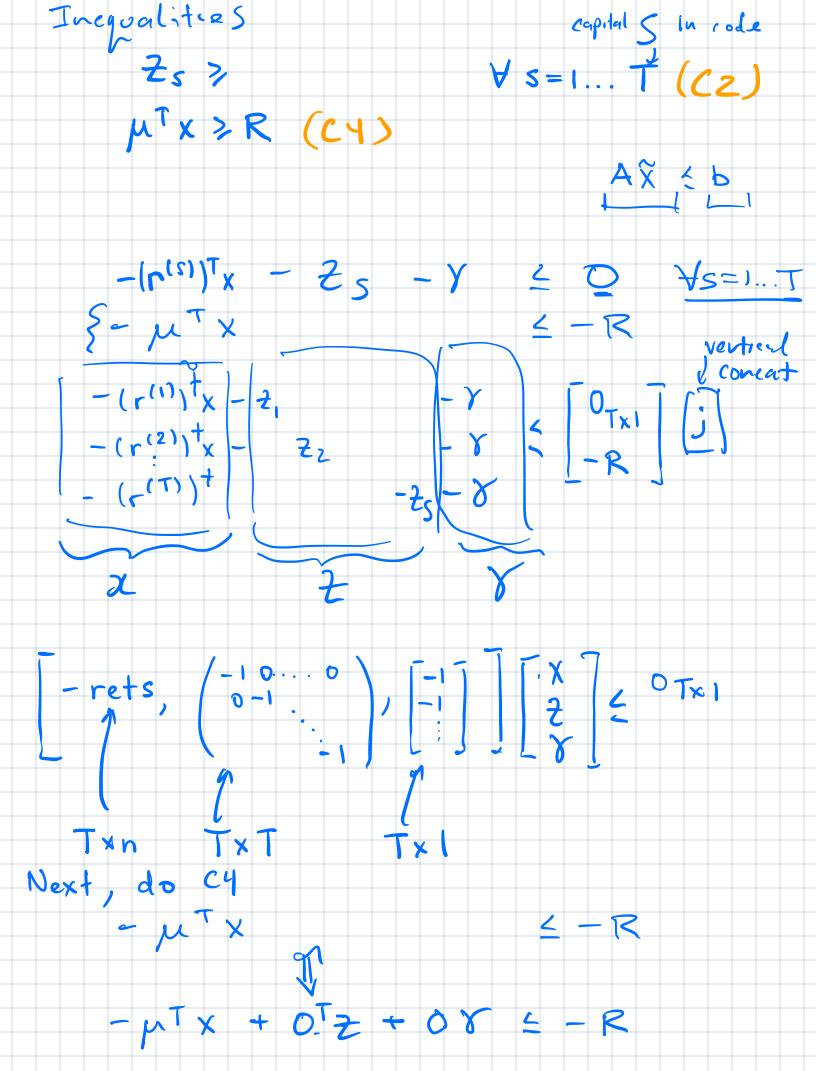
## CVaR Lab 6 rets ETIRP, use each return observation as a scenario $rets = \begin{bmatrix} (r^{(i)})^{+} & r^{(i)} \in {}^{n} \\ \vdots & \vdots & \vdots \\ (r^{(\tau)})^{+} \end{bmatrix}$ is this the only way to define scenarios? -> No! but it is what we are going to do · « - CVar minimization; & is confidence min $Y + \frac{1}{(1-d)T} \sum_{s=1}^{2} z_s$ Y, x, z z > 0 y = 1, ... T (C1) $\frac{2}{5} > -(\mathbf{r}^{(s)})^{\mathsf{T}} \times - \mathbf{y} \quad \forall s = 1... \mathsf{T} \quad (C2)$ $1^{\tau}x = 1$ (C3) µ<sup>T</sup>x ≥ R (C4) xeirn, zeirt, reir Note: (1) at optimality & = VaRa (2) (1) => Zs>, 0, Zs>, -(r(s)) Tx - Vara since we are minimizing 1 225 in the objective, at optimality @ least one of (CI) or (CZ) is tight for each scenario =>7 = max { 0, -(r(s)) x - VaR 2 } 45

1.e Zs = the loss in excess of VaRd @ optimality! Coo! (3) the objective and constraints are all linear in x, Z, x = ok lets solve. Matlab lingrog solves min  $C \times X$ A X = blinprog

doc call!

this fA  $X \times b$ 16 & x & ub - we have to structure the inputs into M so that solving M solves P - lets arrange our x, 2, and 8 so that  $\widetilde{\chi} = \begin{bmatrix} \times \\ - \end{bmatrix} \in \mathbb{R}^{n+\tau+1}$ lets proceed in the order given in the sample code





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