Deadline: **Sun Feb. 04, 2024, 8:00 am** Submit single unzipped PDF file on learn-web course "SoSe 2023: 3104 Modern Optimization Techniques

Instructions

Please following these instructions for solving and submitting the exercise sheet.

1. Student should clearly write his/her name, matriculation number and tutorial group number (i.e. "Group 1: Tuesday Tutorial", "Group 2: Wednesday Tutorial").
2. The submission should be made before the deadline, only through learnweb to your group submission link.
3. Should be submitted as a single unzipped PDF file on learn-web course "SoSe 2023: 3104 Modern Optimization Techniques".
4. Each student must submit an individual solution in-order to be eligible for bonus points.
5. Group submission are acceptable but will not contribute towards bonus points.

1 Inequality Constrained Minimization Problems (5 points)

a) Compute the null space of A and prove it.
:

$$A = \begin{pmatrix} 2 & 3 & 4 \\ -1 & 2 & 3 \end{pmatrix}$$

2 Gradient Projection Method (15 points)

a) Solve the following optimization problems with Active set (gradient projection to find the search direction) method. Given, $x^{(0)} = (2, 0), \alpha = 0.4, \beta = 0.5$. Must use the backtracking line search algorithm to compute the step length.

$$\begin{array}{ll} \text{minimize} & x_1^2 + x_2^2 \\ \text{subject to:} & x_1 - 2x_2 = 2 \end{array}$$