ME4654/5794 OpTech in Eng.
Spring 2025 **Due: 2/13/2025**

HOMEWORK # 2

1) Find candidate local points satisfying Karush-Kuhn-Tucker (KKT) necessary conditions for the following problems (60 points):

a)

Maximize $F(x_1, x_2) = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8$
subject to $x_1 + x_2 = 4$

b)

Minimize $f(x_1, x_2) = (x_1 - 1)^2 + (x_2 - 1)^2$
subject to $x_1 + x_2 \geq 4$
$x_1 - x_2 - 2 = 0$

c)

Minimize $f(x_1, x_2) = 9x_1^2 - 18x_1x_2 + 13x_2^2 - 4$
subject to $x_1^2 + x_2^2 + 2x_1 \geq 16$

2) Solve the following LP problem using the Simplex method. Verify your hand calculation using a numerical tool/software (e. g. Matlab LP) (40 points)

$$\begin{aligned} \text{Maximize } & z = x_1 + 2x_2 \\ \text{Subject to } & -x_1 + 3x_2 \leq 10 \\ & x_1 + x_2 \leq 6 \\ & x_1 - x_2 \leq 2 \\ & x_1 + 3x_2 \geq 6 \\ & x_1,\ x_2 \geq 0 \end{aligned}$$