Department of Mathematics, University of Utah

Introduction to Optimization
MATH 5770/6640, ME EN 6025 – Section 001 – Fall 2021
Homework 2
Optima and optimality conditions

Due September 21, 2021

Submit your homework assignment in hard copy, in-class on the due date.

Text: *Introduction to Nonlinear Optimization*, Amir Beck,

Exercises: # 2.1,
2.2,
2.4,
2.6,
2.11,
2.13(i, ii),
2.15(i, iii, iv, vii),
2.17(i,iii,vi,vii),
2.18

Additional problems:

P1. Define

$$\boldsymbol{A} = \begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}.$$

Using your favorite software, visualize a plot of the Rayleigh quotient $f(\boldsymbol{x}) = R_{\boldsymbol{A}}(\boldsymbol{x})$ for $\boldsymbol{x} \in [-3,3]^2 \backslash \{\boldsymbol{0}\}$, and generate a contour plot for f. Use this visualization to verify the maximum and minimum values of f, as well as the set of $\boldsymbol{x}$ that are maximizers and minimizers.