MAST30013 – Techniques in Operations Research
Semester 1, 2021

Tutorial 6

1. Solve the equality-constrained nonlinear program:

$$\min \quad f(x_1, x_2) \;=\; x_1 x_2$$
$$\text{s.t.} \quad h_1(x_1, x_2) \;=\; x_1^2 + x_2^2 - 1 \;=\; 0.$$

Check the constraint qualifications at each stationary point.

Use the second-order sufficient condition to determine the nature of any stationary points.

2. Solve the equality-constrained nonlinear program:

$$\min \quad f(x_1, x_2, x_3) \;=\; 4 - x_3$$
$$\text{s.t.} \quad h_1(x_1, x_2, x_3) \;=\; x_1^2 + x_2^2 - 8 \;=\; 0$$
$$h_2(x_1, x_2, x_3) \;=\; x_1 + x_2 + x_3 - 1 \;=\; 0.$$

Check the constraint qualifications at each stationary point.

Use the second-order sufficient condition to determine the nature of any stationary points.