

# Math 364 – Homework #1

Due: Thursday August 31, in class

Solve the following optimization problems 1–5 using the methods developed in class. State your methods and reasoning as you complete your solution.

1.

$$\min_{x \in \mathbb{R}^2} f(x) = 2x_1^2 + 4x_2^2 + 3 + 2x_1x_2$$

2.

$$\max_{x \in \mathbb{R}^2} f(x) = 2x_1^2 + 4x_2^2 + 3 + 2x_1x_2$$

3.

$$\begin{aligned} \min_{x \in \mathbb{R}^2} f(x) &= (x_1 - 2)^2 + (x_2 - 1)^2 \\ \text{s.t. } \quad x_1 + x_2 &\leq 0 \end{aligned}$$

4.

$$\begin{aligned} \min_{x \in \mathbb{R}^2} f(x) &= (x_1 - 2)^3 + x_2^2 \\ \text{s.t. } \quad \sin(x_1) &\geq 2 \\ x_1 + x_2 &\geq 2 \end{aligned}$$

5.

$$\min_{x \in \mathbb{R}^2} f(x) = \frac{(x_1^2 + x_2^2)}{2} + e^{-(x_1^2 + x_2^2)}$$

6. Carefully sketch and label several level curves for the objective function of problem #3. Add the feasible region to your sketch. Use your sketch to verify your answer from Problem #3.