IE 203 PS 7

1- Determine the extremum points of $f(x_1, x_2) = x_1^3 + x_2^3$

2- For the following constrained nonlinear problem, write the KKT necessary conditions, find KKT point(s) and classify them if possible.

$$
\begin{aligned}
\min \quad & x_1^2 + 2x_2^2 \\
s.t. \quad & x_1 + x_2 = 2 \\
& 2x_1 - x_2 \leq 2 \\
& x_1 \geq x_2
\end{aligned}
$$

3- For the following constrained nonlinear problem, write the KKT necessary conditions, find KKT point(s) and classify them if possible.

$$
\begin{aligned}
\max \quad & x_1 x_2 \\
s.t. \quad & x_1 + x_2^2 \leq 2 \\
& x_1, x_2 \geq 0
\end{aligned}
$$