1. The equation: \( xz + y + z^3 - 1 = 0 \) defines \( z \) as a function of \( x \) and \( y \) near the point \( x = 0, \ y = 0, \ z = 1 \). Find:

\[
\frac{\partial^2 z}{\partial x^2}(0,0), \quad \frac{\partial^2 z}{\partial x \partial y}(0,0), \quad \frac{\partial^2 z}{\partial y \partial x}(0,0), \quad \frac{\partial^2 z}{\partial y^2}(0,0).
\]


3. Textbook page 159, Exercise 8. Note that in part a) there are no boundary points. You need though to check what happens as \( x^2 + y^2 \to \infty \) in order to determine the absolute minima and maxima. Same applies to part d).

4. Textbook page 158, Exercise 4 parts b), c), d), f) and g). You should also classify the critical points into relative minima, relative maxima, saddle points or undetermined.

5. Textbook page 159, Exercise 6 parts b), d) and e).