Exercise 1 Find the global maximum and the global minimum of the function
\[ y = x^3 - x^2 \]
on the interval \([-2, 2]\).

Exercise 2 Show that the function
\[ z = \ln (x^3 y^5) \]
is concave.

Exercise 3 Derive the equation \( z = ax + by + c \) of the tangent plane which touches the function
\[ z = x^2 y^3 \]
at the point \((5, 2)\).

Exercise 4 Determine the distance between the points \((2, 3)\) and \((3, 2)\). Find all vectors which have a right angle with \((2, 3)\). Draw a diagram and check your results geometrically.

Exercise 5 Draw a Venn diagram to illustrate the symmetric difference
\[ A \triangle B = (A \setminus B) \cup (B \setminus A) \]
of two sets. Use Venn diagrams to illustrate the identity
\[ (A \triangle B) \triangle C = A \triangle (B \triangle C). \]

Exercise 6 Is the intersection of two open sets open?

Exercise 7 Is the intersection of an infinite number of open sets always open?

Exercise 8 Is an arbitrary union of open sets open?

Exercise 9 It can be shown for a closed convex set that it is the intersection of all halfspaces that contain it. Is the same true if the set is closed, but not necessarily convex?