Exercise 1 Let $F(K, L) = 10K^{\frac{1}{2}}L^{\frac{1}{3}}$ where $K \geq 0$ and $L \geq 0$

Find $F(1, 1)$, $F(4, 27)$, $F(9, \frac{1}{27})$, $F(3, \sqrt{2})$, $F(100, 1000)$ and $F(2K, 2L)$

Exercise 2 Calculate the partial derivatives of

$$
\begin{aligned}
\text{a) } z &= x^3 + 3x^2y^2 + y^3 \\
\text{b) } z &= \frac{x + y}{x^2 + y^3} \\
\text{c) } z &= (x^2 + y)(x - y^2) \\
\text{d) } z &= (x^3 + y^2)^{0.5}
\end{aligned}
$$

Exercise 3 Find all second derivatives $\frac{\partial^2 z}{\partial x^2}$, $\frac{\partial^2 z}{\partial y \partial x}$, $\frac{\partial^2 z}{\partial x \partial y}$ and $\frac{\partial^2 z}{\partial y^2}$ of

$$
\begin{aligned}
\text{a) } z &= x^3 y^3 \\
\text{b) } z &= x^2 + 2x - 3y + y^2
\end{aligned}
$$

Exercise 4 For the production function

$$
Q = 10K^{0.5}L^{0.5}
$$

a) Find the isoquant (level curve) for $Q = 100$ and express in explicit form (i.e. with K the subject)

b) Find the first and second derivatives; what does this tell you about the marginal rate of substitution?

c) Determine the marginal product of labour and capital.