1 Project task (Utility function of Meta)

To examine the utility function of a social network, the value of Meta Platforms (formerly Facebook) shall be considered as a function of the number of its users. It is best given by the number of monthly active users (MAU) stated in Meta's annual report, and the value of the network is measured by the value of total assets also documented there. For the financial years 2008 to 2021, the values are listed in the file on Moodle.

In network theory, a preferred model of the utility of a network is given by the so-called Metcalfe utility function

$$u_{\mathrm{M}}(x) = a \cdot \frac{x(x-1)}{2},$$

where the parameter a is a "scaling coefficient" and x denotes the number of nodes in the network.

Research questions

(a) What model function should be preferred to estimate the total assets as a function of the MAU x: the Metcalfe utility function or a linear regression function?

(b) Discuss how your preferred model relates to the law of diminishing marginal utility.