Exercise Session 1
GDP Measurement, Growth, and Business Cycles

TASK 1: Logs and Levels
Express the following function as log-linear functions, i.e., take the log of the function and simplify as much as possible.

(a) $Y = zK^{\alpha}N^{1-\alpha}$,
(b) $Z = ce^{rt}\beta^{K}$.

TASK 2: Growth Rates
Consider a variable X with a constant growth rate, $g > 0$ for the period $t_o$to t_1, decreases in t_1 to zero, and then increases gradually from zero back to g from $t_1$to t_2. After that, it remains constant.

(a) Plot the evolution of the growth rate of X as a function of time.
(b) Plot the evolution of $ln(X)$ as a function of time.

TASK 3: Review
Answer the following questions concisely in 2 to 4 sentences.

(a) Why do the different computation methods of GDP yield the same results? For simplification, no distinctions into open economies are made for the sake of this argument. Imagine a global economy that can be represented as a closed economy.

(b) What is the difference between real and nominal variables?

(c) GDP is an estimate. Describe and discuss the measurement issues that are associated with that.

(d) Why is real GDP often represented in its log-form?
Mathematical illustration of verbal arguments:
(dd) Show, mathematically, that if GDP grows at a constant rate g, its log representation is a straight line.

(e) How is the business cycle traditionally defined?

(f) What do potential output and the output gap measure and why is it important to distinguish the two from a policy perspective?

(g) Explain why evaluating past policy decision based on revised data might be problematic.