Consider the following relationship between two variables $Y$ and $X$:

$$Y = AX^b, \quad A > 0. \quad (1)$$

1. With $Y$ on the vertical axis and $X$ on the horizontal axis, produce a graph of $Y$ versus $X$ for $b < 0$. In doing so, calculate the intercept and slope analytically.

2. With $Y$ on the vertical axis and $X$ on the horizontal axis, produce a graph of $Y$ versus $X$ for $0 < b < 1$. In doing so, calculate the intercept and slope analytically.

3. With $Y$ on the vertical axis and $X$ on the horizontal axis, produce a graph of $Y$ versus $X$ for $b > 1$. In doing so, calculate the intercept and slope analytically.

4. Repeat the exercise in (1), with $Y$ on the horizontal axis and $X$ on the vertical axis.

5. Repeat the exercise in (2), with $Y$ on the horizontal axis and $X$ on the vertical axis.

6. Repeat the exercise in (3), with $Y$ on the horizontal axis and $X$ on the vertical axis.

7. Consider the following characterization of a variable $X_t$ as a function of time $t$:

$$X_t = X_0e^{gt}, \quad X_0 > 0, \ g > 0. \quad (2)$$

Construct a time-series graph of $X_t$; i.e., construct a graph depicting $X_t$ on the vertical axis, and time $t$ on the horizontal axis. Calculate the intercept and slope analytically.

8. Again with $X_t$ behaving as specified in (2), construct a time-series graph depicting $x_t = \ln(X_t)$ against time $t$. Calculate the intercept and slope analytically.

9. Again with $X_t$ behaving as specified in (2), calculate the growth rate of $Y_t$, for $Y_t$ given as

$$Y_t = AX_t, \quad A > 0. \quad (3)$$

10. Again with $X_t$ behaving as specified in (2), calculate the growth rate of $Y_t$, for $Y_t$ given as

$$Y_t = AX_t^b, \quad A > 0, \ b > 0. \quad (4)$$