Lab 10
Linear Regression

Ex. 1 (2.5p) A company wants to analyze the relationship between advertising expenses and the sales of a product. They have collected data on weekly advertising expenses (in thousands of dollars) and weekly sales revenue (in thousands of dollars) for the past 20 weeks. The company's hypothesis is that there is a linear relationship between expenses and revenue, but they expect this relationship to be influenced by uncertainties or noise in the data (for example, other external factors affecting sales). The company wants to build a Bayesian linear regression model that:

a) (0.5p) estimates the regression coefficients (intercept and slope);
b) (0.5p) provides credible intervals (HDI) for these coefficients;
c) (0.5p) predicts future revenues for new levels of advertising expenses.

The data collected for the two attributes are shown in the following table:

publicity:	1.5	2.0	2.3	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
sales:	5.2	6.8	7.5	8.0	9.0	10.2	11.5	12.0	13.5	14.0	15.0	15.5	16.2	17.0	18.0	18.5	19.5	20.0	21.0	22.0

By using PyMC, solve the above problems.