PROPOSED EXERCISES UNIT 8

1) (Sheet '*Farm_production*') Data about the *production costs* (X) and the *total income* (Y), both in millions of euros, of a family farm during the last seven years are available in sheet '*Farm_production*'. It also presents the linear fit obtained in proposed exercises of Practice Unit 7 with this data set.

- **A)** Using the scatter plot of the variables obtain a polynomial regression function (order 2) that explains the total income based on the production costs.
- **B)** Analyse the goodness of fit of the previous regression model.
- **C)** Using the information obtained in the analysis of the goodness of fit, indicate which of the two models, the linear or the polynomial, fits better the data. Using the best fit, calculate the estimated income of the family farm for the next year if the production costs will be of 6 million of euros. Is this estimation reliable?

2) (Sheet '*Refreshments*') The marketing director of a soft drink company wants to study the effect of price on weekly sales of two-litre bottles of his cola. To do this, it selects a random sample of 20 stores and then randomly assigns a sale *price* between 0.5€ and 2€ per bottle in each of the stores. This price is maintained for a week in each store and at the end the weekly *sales* of the product are recorded. The results obtained are collected in the *Refreshments* sheet.

- **A)** Use a scatter plot to present graphically the data (select *Sales* as the endogenous variable). What can be observed from the graphic presentation?
- **B)** Estimate an exponential model that explains *Sales* based on *Price* ($Y = ae^{bX}$) transforming the variables in the appropriate way to obtain a linear model and using the Excel functions. Interpret the coefficients.
- **C)** Analyse the goodness of fit of the previous regression model using the general coefficient of determination.
- **D)** Calculate the estimated weekly sales if the price per bottle is set at 0.8€. Is this estimation reliable?
- **E)** Calculate the estimated weekly sales if the price per bottle is set at 3€. Is this estimation reliable?