1. Consider the following production function: \( Y = Ax^\beta \), where \( x \) is a productive input, \( Y \) is output, \( A > 0 \) and \( 0 < \beta < 1 \). Let \( \omega \) denote the price per unit of \( x \).

1a. Determine whether this production function features constant, increasing or decreasing returns to scale.

1b. Calculate and graph the Total, Average and Marginal Cost functions associated with this production technology. Graph the Total Cost function separately from the Average and Marginal Cost functions.

1c. Suppose \( P \), the price of \( Y \), is required by law to equal Marginal Cost. Derive an expression that relates \( Y \) as a function of \( P \) under this rule (set \( P = MC \) and solve for \( Y \)). Also, graph this relationship (construct a graph with \( P \) on the vertical axis and \( Y \) on the horizontal). Will firms earn positive profits under this law?

2. Repeat the steps required for question 1 with \( \beta = 1 \).

3. Repeat the steps required for question 1 with \( \beta > 1 \).

4. Repeat the steps required for question 1 for the production function \( Y = Ax – F \).