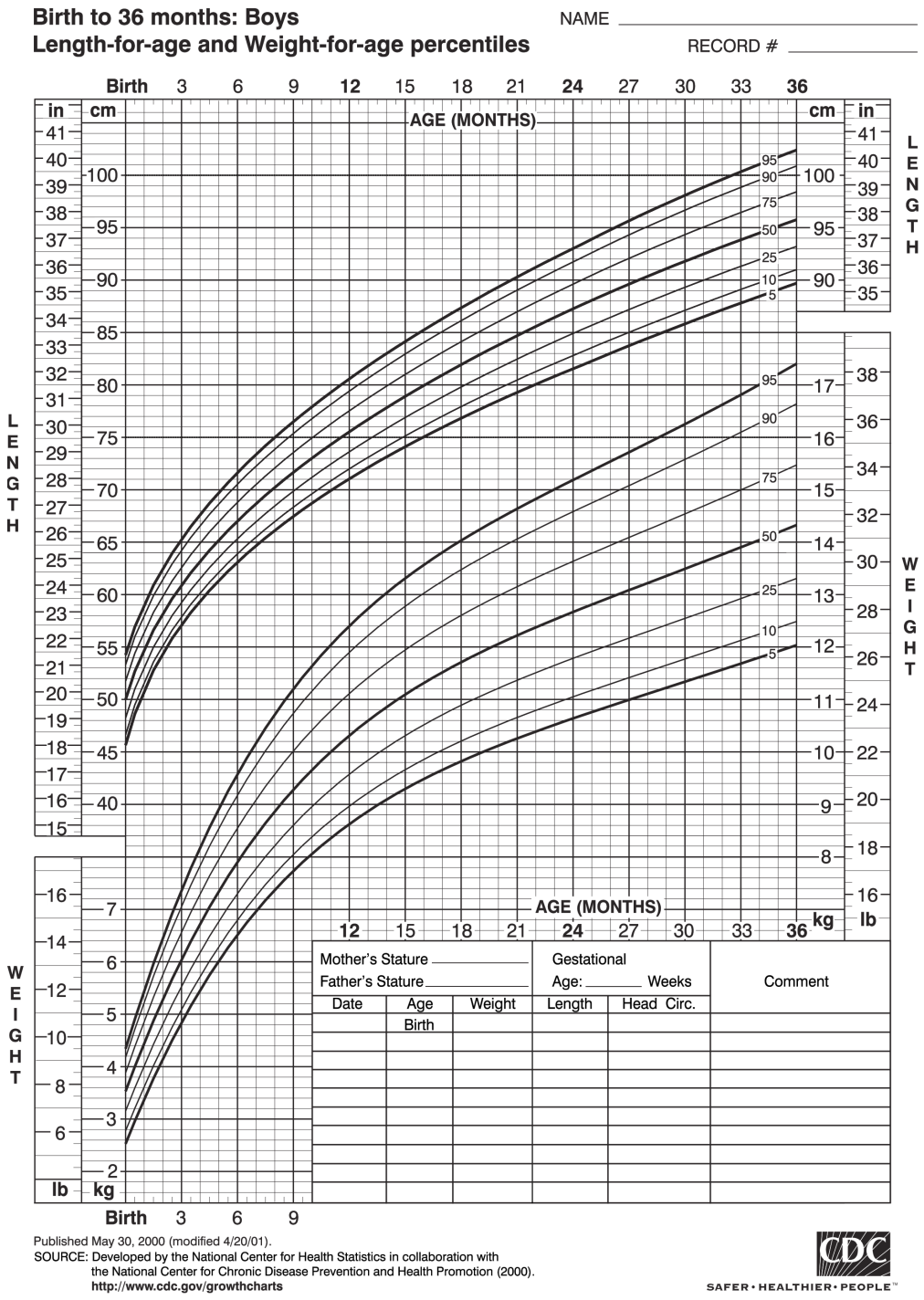
Machine Learning

Modelling and regression.

Consider the following chart, with growth curves for male babies in the United States:



1. In the period from 24 to 36 months of age, which of the following parametric models is most appropriate to describe the evolution of the baby's weight (y) with age (x)?
   (a) $y = a$.
   (b) $y = ax$.
   (c) $y = ax + b$.
   (d) $y = ax^2 + bx + c$.
2. For a certain baby, the following weight measurements were obtained:

Months	Weight
24	13
30	14
36	16

   Write, for this dataset, the expression of the total squared error of the model as a function of the parameters.
3. Find the stationary points of that cost function. Specify whether they are maxima, minima, or saddle points.
4. Write down the normal equations for a least squares fit. Then, find the solution and compute the associated error.
5. Estimate the baby's weight at the ages of 25 and 34 months, using the model that you have obtained, with the optimal parameters.
6. Is the model that you have obtained adequate to estimate the baby's weight at the age of 9 months? How would you estimate that value?
7. Solve items 4. and 5. again, this time using Python.