

1, Example: Price discovery

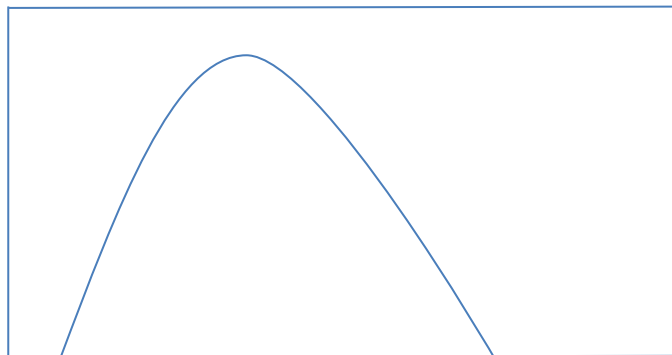
Example:

$$\begin{cases} 2a + 3b = 8 \\ 10a + 1b = 13 \end{cases} \rightarrow \begin{pmatrix} 2 & 3 \\ 10 & 1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 8 \\ 13 \end{pmatrix}$$

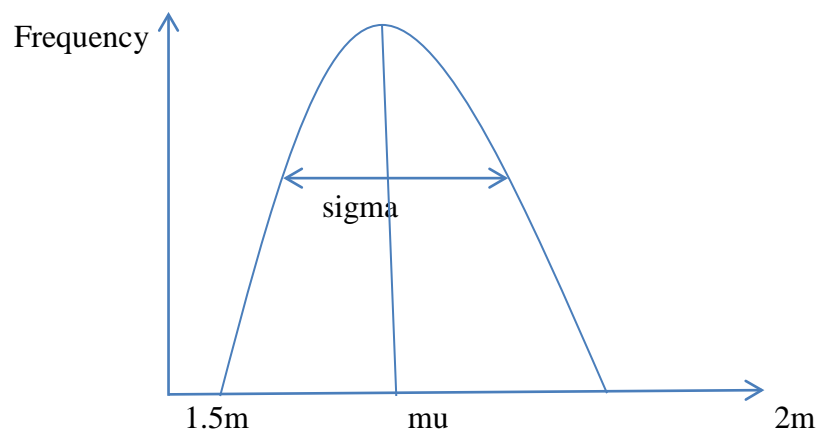
--- Objective: Solve the simultaneous equations to discover the price of individual apples and bananas.

--- When come millions of different types: It might be quite difficult to solve all these equations by hand. So, we might want a computer algorithm to do it for us, in the general case.

2, Another problem to solve is how to find the optimal value of the parameters in the equation describing this line:

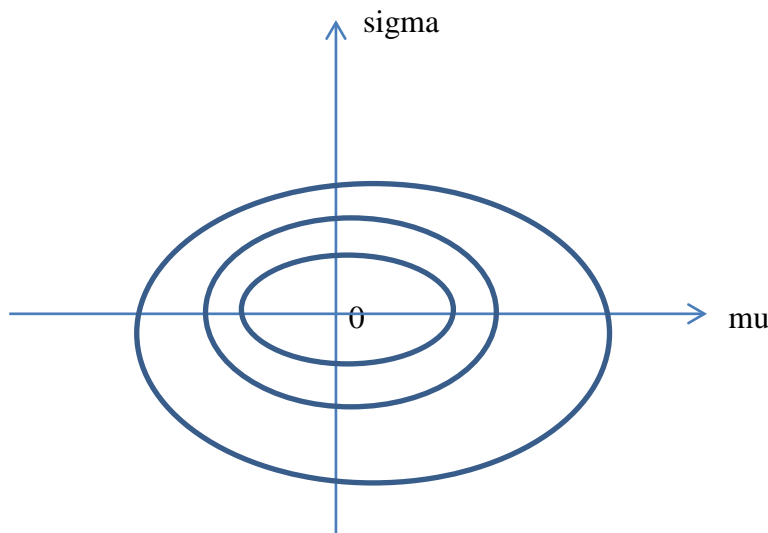
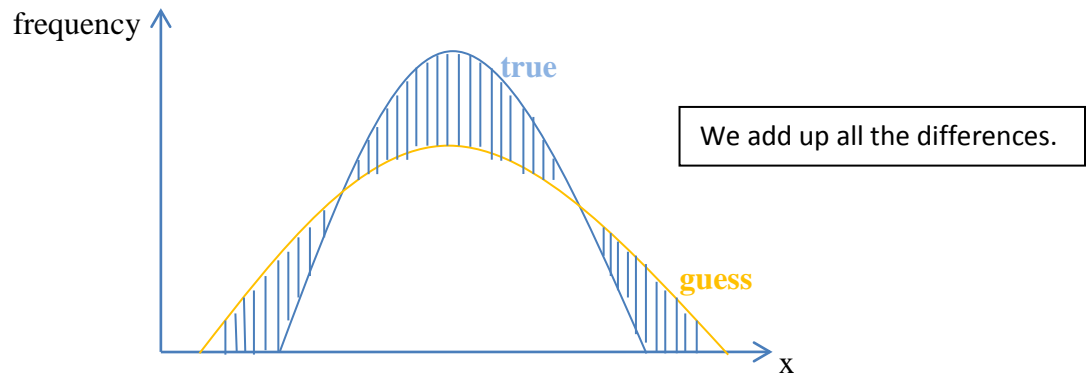


3,



$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(\frac{-(x - \mu)^2}{2\sigma^2}\right)$$

How to fit this distribution? --- Find the best possible *mu* and *sigma* that fits the data as well as is possible.



--- Adjustments: Vectors can be thought of in a variety of different ways – some geometrically, some algebraically, some numerically. In this way, there are a lot of techniques one can use to deal with vectors.

4, What is a vector?

1) A list of numbers; 2) Position in three dimensions of space and in one dimension of time; 3) Something which moves in a space of fitting parameters.