$$\bar{p}(x) = \exp\left(-\frac{x_1^2}{10} - \frac{x_2^2}{10} - 2\left(x_2 - x_1^2\right)^2\right)$$

This density has a non-linear structure where x_2 is strongly dependent on x_2. We can use a product of two Gaussian distributions with: