Homework 6
Due September 19, at class

Suppose that we have two competing probability models for a scalar observation:

\[ H_0 : p_0(x) = \frac{1}{\sqrt{2}} e^{-\frac{3}{2}|x|} \]
\[ H_1 : p_1(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2} \]

a. Show that the two models have the same mean and variance, and plot the density functions.

b. Find the likelihood ratio.

c. Compute the decision regions for the various values of the threshold in the likelihood ratio test.

d. Design a Bayes detector with \( p_0 = p_1 = 1/2, c_{0,0} = c_{1,1} = 0 \) and \( c_{1,0} = c_{0,1} = 1 \) (this gives a threshold \( \eta = 1 \)). Compute the Bayes cost of the resulting decision rule. (You can use the Matlab function \texttt{erf} to numerically compute the integrals over the Gaussian density.)