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Q 1. Consider the problem of testing the simple hypothesis that the true density is f_0 against f_1 based on a single observation x. For any $\alpha > 0$ construct the UMP test of size α according to Neyman-Pearson lemma. Determine the power as a function of α

a.) $f_0(x) = 2x,\ 0 \leq x \leq 1;\ 0$ otherwise. $f_1(x) = 2(1-x),\ 0 \leq x \leq 1;\ 0$ otherwise.

b.) $f_0(x) = 1,\ 0 \leq x \leq 1;\ 0$ otherwise. $f_1(x) = 2,\ 0 \leq x \leq \frac{1}{2};\ 0$ otherwise.

Q.2. One wants to test that the mean of a normal population is zero. It is known the the variance is 1. If one wants to be sure that for any alternative with $|\mu| > 1$, the power of the test be atleast 0.95, while the size of the test remains at 0.05, how large should the sample be?