H. L. Van Trees
Detection, Estimation, and Modulation Theory : Part I
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Two particularly interesting curves are those for $N = 8$, $\sigma_s^2/\sigma_n^2 = 1$ and $N = 2$, $\sigma_s^2/\sigma_n^2 = 4$. In both cases the product $N\sigma_s^2/\sigma_n^2 = 8$. We see that when the desired P_F is greater than 0.3, P_D is higher if the available "signal strength" is divided into more components. This suggests that for each P_F

and product $N\sigma_s^2/\sigma_n^2$ there should be an optimum N. In Chapter 4 we shall see that this problem corresponds to optimum diversity in communication systems and the optimum energy per pulse in radar. In Figs. 2.35*b* and *c* we have sketched P_M as a function of N for $P_F = 10^{-2}$ and 10^{-4}, respectively, and various $N\sigma_s^2/\sigma_n^2$ products. We discuss the physical implications of these results in Chapter 4.

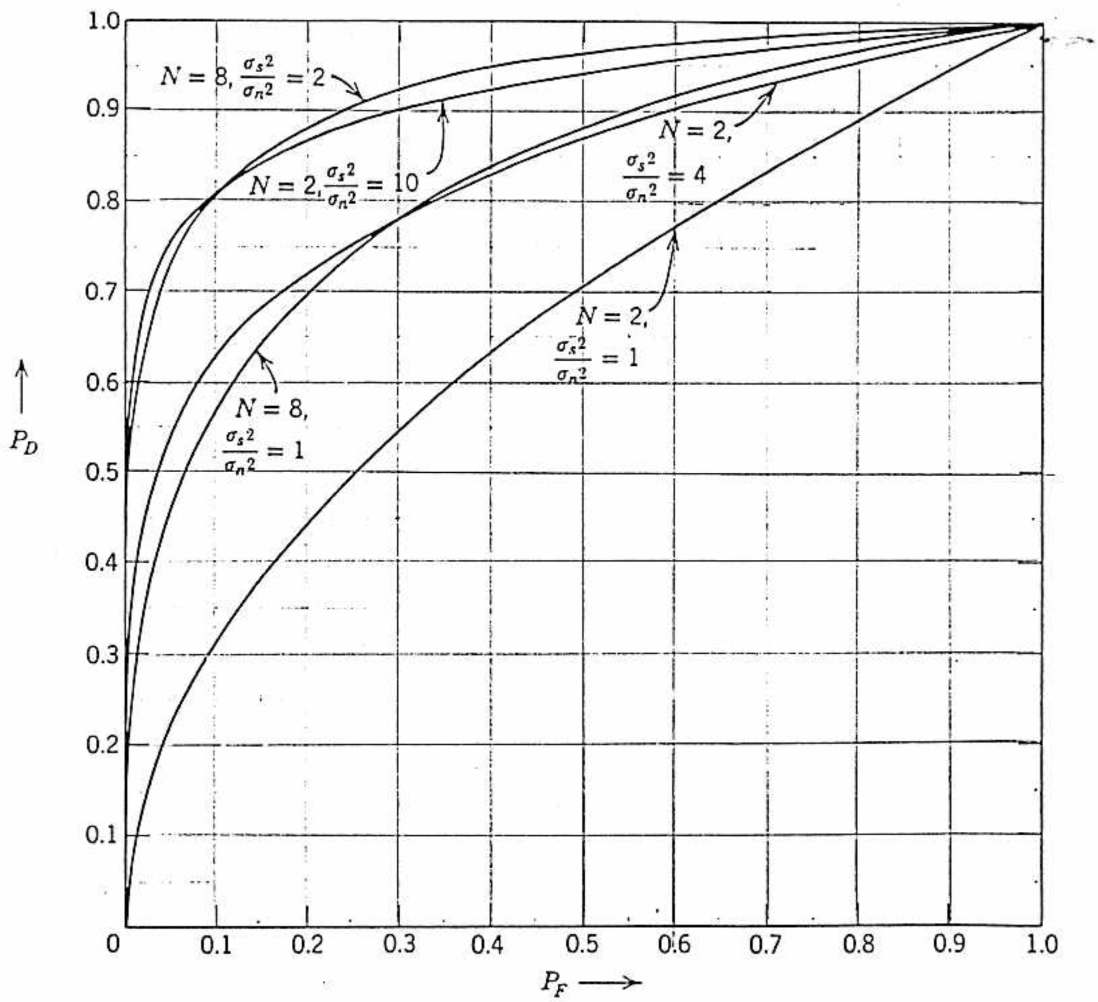

Fig. 2.35 ***a*. Receiver operating characteristic: Gaussian variables with identical means and unequal variances on the two hypotheses.**