[nex8] From Gaussian to exponential distribution

A random variable X has a continuous Gaussian distribution $P_X(x)$ with mean value $\langle X \rangle = 0$ and variance $\langle\langle X^2 \rangle\rangle = 1$. Find the distribution function $P_Y(y)$ for the stochastic variable Y with values $y = x_1^2 + x_2^2$, where x_1, x_2 are independent realizations of the random variable X. Calculate the mean value $\langle Y \rangle$ and the variance $\langle\langle Y^2 \rangle\rangle$.

Solution: