[nex3] **Gaussian shootist versus Lorentzian shootist**

The shots of two marksmen on a square-shaped target of dimensions 20cm×20cm are found to be distributed with probability densities

$$P_1(x,y) = C_1 e^{-(x^2+y^2)}, \qquad P_2(x,y) = \frac{C_2}{1+x^2+y^2},$$

where $r = \sqrt{x^2+y^2}$ is the distance from the center of the target, and C_1, C_2 are normalization constants. Answer the following questions separately for each marksman.

(a) What is the probability that a given shot that hits the target is at least 1cm high ($y >$ 1cm)? (b) Given that a shot that hits the target is at least 1cm high ($y >$ 1cm), what is the probability that it is also at least 1cm to the right ($x >$ 1cm)?