STA 213

Problem 4.14

(a) X^2 and Y^2 are independent since X and Y are independent. X^2 (and Y^2) has a chi squared distribution with 1 degree of freedom. See Example 2.1.6, page 52, in your text book.
$X^2 + Y^2 \sim \chi^2_2$. See example 4.6.3, page 175, which has to do with sums of independent gamma random variables and note that a χ^2_p random variable is a gamma$(p/2, 2)$. Then from the tables of the χ^2 distribution we can derive

$$\Pr(X^2 + Y^2 < 1) = 0.393$$

(b)

$$\Pr(X^2 < 1) = 0.682$$