

124. Solution: A

Because  $f(x,y)$  can be written as  $f(x) f(y) = e^{-x} 2e^{-2y}$  and the support of  $f(x,y)$  is a cross product,  $X$  and  $Y$  are independent. Thus, the condition on  $X$  can be ignored and it suffices to just consider  $f(y) = 2e^{-2y}$ .

Because of the memoryless property of the exponential distribution, the conditional density of  $Y$  is the same as the unconditional density of  $Y+3$ .

Because a location shift does not affect the variance, the conditional variance of  $Y$  is equal to the unconditional variance of  $Y$ .

Because the mean of  $Y$  is 0.5 and the variance of an exponential distribution is always equal to the square of its mean, the requested variance is 0.25.