HW 6 Mean and Variance of Conditional Joint Probability Function

- Create R function for computing the conditional mean of Y and conditional variance of Y when X = x using **matrix( )** with the below data.
- Find the following conditional mean and variance values …

E(Y|X=1) = ? (answer = 3.55)

V(Y|X=1) = ? (answer = 0.7475)

E(Y|X=2) = ?

V(Y|X=2) = ?

E(Y|X=3) = ?

V(Y|X=3) = ?

y = Response time(nearest second)	x = Number of Bars of Signal Strength			$f(y)$	
	1	2	3		
1	0.01	0.02	0.25	0.28	
2	0.02	0.03	0.20	0.25	
3	0.02	0.10	0.05	0.17	
4	0.15	0.10	0.05	0.30	
$f(x)$	0.20	0.25	0.55	y*f(y|x=1)	y^2*f(y|x=1)
1	0.050	0.080	0.455	0.05	0.05
2	0.100	0.120	0.364	0.20	0.40
3	0.100	0.400	0.091	0.30	0.90
4	0.750	0.400	0.091	3.00	12.00
Sum of f(y|x)	1.000	1.000	1.000	3.55	13.35
					12.6025
					0.7475

- What should the response time (Y) be when X = 3? Why?

Hint:

- Joint = given discrete joint probability data
- Joint = matrix(c(0.01,0.02,0.25,0.02,0.03,0.20,0.02,0.10,0.05,
  0.15,0.10,0.05),nrow=4,ncol=3)
- The formulas to compute the Mean and Variance of conditional probability are ...

$$E(Y|x)=\int_y y\cdot f_{Y|x}(y) \qquad \text{and} \qquad V(Y|x)=\int_y\left(y-\mu_{Y|x}\right)^2\cdot f_{Y|x}(y)=\int_y y^2\cdot f_{Y|x}(y)-\mu_{Y|x}^2$$

when $f_{Y|x}(y)=\dfrac{f_{XY}(x,y)}{f_X(x)}$ for $f_X(x)>0$

Note: summation(Σ) will be substituted ∫ in case of discrete data