Quiz 1

Your name here

1. True or False. Let $p(x_i, y_j)$ be the joint probability mass function, $i = 1 \ldots n; j = 1 \ldots m$. It follows that $\sum_{i=1}^{n} \sum_{j=1}^{m} p(x_i, y_j) = 1$.

Answer:

2. The following table display the joint probability distribution for (x_i, y_j) where x indicates whether or not someone participated in the job training program, and y whether or not someone is currently unemployed.

Job Training\Unemployment	0	1	p(x)
0	0.2	0.4	
1	0.2	0.2	
p(y)			

a. Calculate the cumulative distribution function: $F(1, 0) =$
b. Calculate the marginal distribution for both Y and X, in other words, how many people are currently unemployed or employed; and how many people participated in the job training program, and how many did not. And fill in the cells in Table (1).
c. Are X and Y independent of each other? Suppose that this is the true joint distribution, not an estimated one, so you do not have to worry about sampling errors.

3. Use the following data to study the joint distribution in `R`.

```
set.seed(123456)
x<-sample(0:1,1000, replace = T, prob=c(.4,.6))
data<-data.frame(x, y=NA)
data$y[data$x == 1] <- sample(0:1, sum(data$x == 1), replace = T, prob=c(0.1,0.9))
data$y[data$x == 0] <- sample(0:1, sum(data$x == 0), replace = T, prob=c(0.2,0.8))
```

a. Calculate the joint pmf using `xtabs()` command (otherwise the `mosaic()` below may give an error message).

b. Calculate the marginal distribution for both x and y in `R`

c. Plot a 3-D histogram of the joint distribution

d. Plot a 2-D mosaic plot of the joint distribution

e. Looking at these plots, can X and Y be independent?

Answer: