HW2

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R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
# summary(cars)
```

Including Plots

You can also embed plots, for example:

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

Problem 1

1.

```
Var(X - Y) = Var[X + (-Y)] = Var(X) + Var(Y) - 2Cov(X, Y) (mailing tube (3.73))

Let X and Y be independent random variables. Then, E(XY) = E(X) * E(Y).

By definition, Cov(U, V) = E(UV) - E(U) * E(V)  (mailing tube (3.72)).

Thus, in this problem, Cov(X, Y) = E(XY) - E(X) * E(Y)
                                 = E(XY) - E(XY)
                                 = 0

Thus, when X and Y are independent, then Var(X - Y) = Var(X) + Var(Y)
```

2.

Problem 4

1. The values the random variable can take are {(1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4)}
2. The PMF is:

X	2	3	4	5	6	7	8
P(x)	1/16	2/16	3/16	4/16	3/16	2/16	1/16

3. The Expected value of X is:

```
E(x) = x*f(x) = 2*(1/16) + 3*(2/16) + 4*(3/16) + 5*(4/16) + 6(3/16) + 7*(2/16) + 8*(1/16)
= 80/16
```

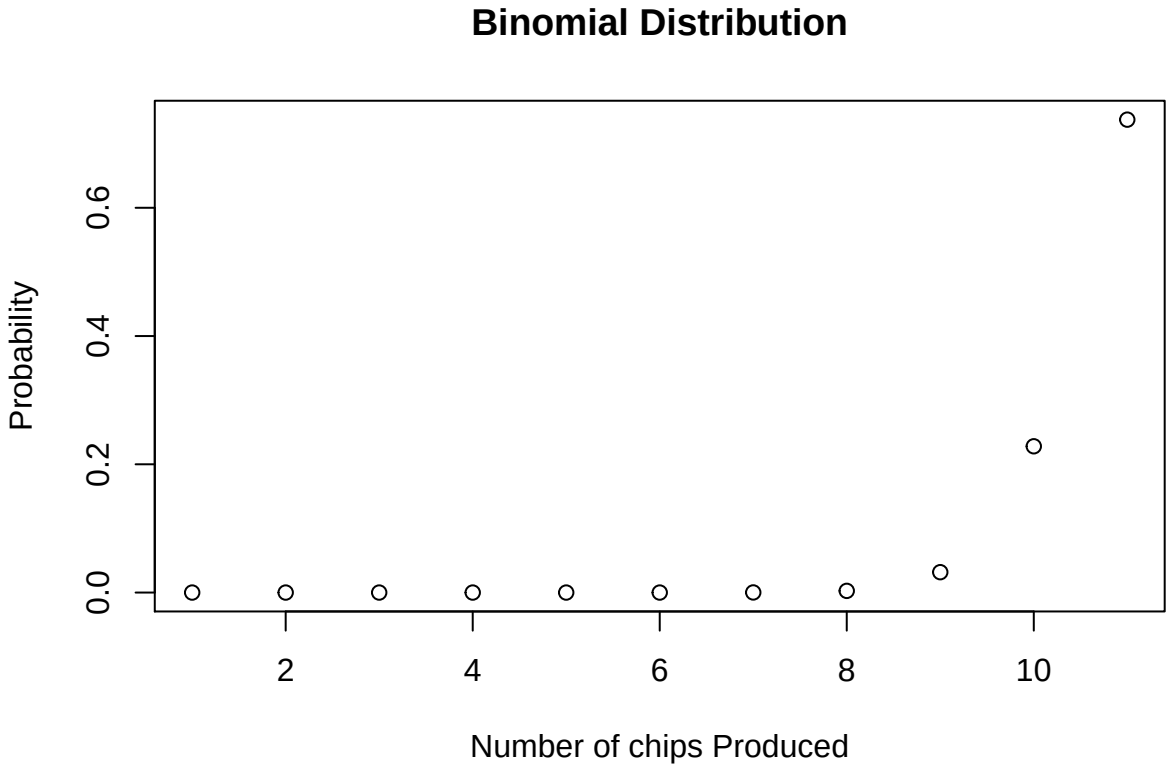
Problem 5

1.

```
The PMF of x:
    P(x = X) = nCx * p^x * (1-p)^n-x
    P = 0.97, n = 10
```

```
 X <- 0:10

plot(dbinom(X,10,0.97), col="black", main = "Binomial Distribution", xlab = "Number of chips Produced",
```



2.

The rate of failure p' = 1 - 0.97 = 0.03

```
1-pbinom(1,10,0.03)
```

```
## [1] 0.03450656
```