Hw9

12.1 An example of design of experiments can be used for # of apples grown in farm. Different trees could be used mixed with different factors for measuring growth such as richness of soil, amount of water, temperature, and other factors. By comparing different growth conditions we can see which set of parameters gives the optimum amount of growth for fruit and which cases fail.

```
Design <- FrF2(nruns = 16, nfactors = 10,
               factor.names = c("3+ Bedrooms", "backyard","2+ car garage", "patio", "washing machine",
                                "hot tub", "solar roof"),
               default.levels = c(-1,1))
```

```
Design
```

```
##    X3..Bedrooms backyard X2..car.garage patio washing.machine Big.kitchen pool
## 1           -1        1             -1     1              -1           1   -1
## 2            1       -1              1    -1              -1           1   -1
## 3            1       -1             -1     1              -1          -1    1
## 4           -1       -1              1    -1               1          -1   -1
## 5           -1        1              1    -1              -1          -1    1
## 6            1       -1              1     1              -1           1   -1
## 7            1        1              1    -1               1           1    1
## 8           -1       -1             -1     1               1           1    1
## 9           -1        1              1     1              -1          -1    1
## 10          -1       -1             -1    -1               1           1    1
## 11           1        1             -1    -1               1          -1   -1
## 12          -1        1             -1    -1              -1           1   -1
## 13           1       -1             -1    -1              -1          -1    1
## 14           1        1              1     1               1           1    1
## 15          -1       -1              1     1               1          -1   -1
## 16           1        1             -1     1               1          -1   -1
##    Carpet.floors hot.tub solar.roof
## 1            -1      -1          1
## 2            -1       1          1
## 3             1       1          1
## 4             1       1         -1
## 5             1      -1          1
## 6             1      -1         -1
## 7            -1      -1         -1
## 8            -1       1         -1
## 9            -1       1         -1
## 10            1      -1          1
## 11           -1       1          1
## 12            1       1         -1
## 13           -1      -1         -1
```

1

```
## 14               1       1          1
## 15              -1      -1          1
## 16               1      -1         -1
## class=design, type= FrF2
```

13.1

a. If new drug is created to cure a disease, then find the prob. that the drug cures the disease or doesn't cure disease. Anything with success or failure can be modeled by binomial dist.

b. In manufacturing line, the ith item on the production line is defective can be modeled using geometric dist. All parts made pass and find until you find a defective item.

c. Poisson dist can be used to see how many network failures there are for cellphones. Companies can use this info and see if how many network failures in a particular time frame and estimate for a future time frame how many failures will occur.

d. Exponential dist can be used to predict when an earthquake will occur in a particular location. Previous data can be entered in exponential dist. and this can then be used to predict in future when eartquake might occur.

e. Weibull dist. can be used for warranty analysis for when a particular product fails. You can see how long its lifespan is and when it might breakdown.

13.2

Using the arena simulation and the specified parameters given in the problem, I was able to get less than 15 minutes with 2 security lanes while each lane runs 10 hours a day with 50 replications. I get total time as 0.026 hours.