Question 1.2:

```
Erdos
84 trials resulted in epidemics
Mean proportion infected with condition : 94.756405
Mean proportion infected without conditioning : 85.281902
Preferential
77 trials resulted in epidemics
Mean proportion infected with condition : 87.767474
Mean proportion infected without conditioning : 78.991864
Actor
57 trials resulted in epidemics
Mean proportion infected with condition : 60.598130
Mean proportion infected without conditioning : 36.467543
Erdos vs Preferential
(0.84688346883468835, 0.35743548696217842, 1, array([[ 82.,  18.],
       [ 82.,  18.]]))
Preferential vs Actor
(2.7673482276003343, 0.096205419014361318, 1, array([[ 74.09411765,  19.90588235],
       [ 59.90588235,  16.09411765]]))
Erdos vs Actor
(20.023809523809526, 7.6483890770273901e-06, 1, array([[ 70.,  30.],
       [ 70.,  30.]]))
```

According to the output, the Erdos-Renyi graph appear to be more susceptible to epidemics than the Preferential Attachment graph. This is because Erdos-Renyi graph appears to have higher final percentage infected. Overall, Erdos-Renyi graph is more susceptible to spread of disease. In the Preferential Attachment graph, a random node would not have a high degree causing higher infection rate. A random node in Erdos-Renyi graph will have higher degree than that of the Preferential Attachment. According to the Chi-Squared test, the Preferential Attachment graph vs the Erdos-Renyi graph does not have any significant differences.

Question 1.3:

```
Erdos
75 trials resulted in epidemics
Mean proportion infected with condition : 94.775369
Mean proportion infected without conditioning : 71.082949
Preferential
95 trials resulted in epidemics
Mean proportion infected with condition : 87.897162
Mean proportion infected without conditioning : 83.502589
Actor
90 trials resulted in epidemics
Mean proportion infected with condition : 61.410429
Mean proportion infected without conditioning : 55.269955
```

On average, the highest degree node in the Preferential Attachment graph will have higher degree than the ones in the Erdos-Renyi graph. This will cause higher infection in the Preferential Attachment graph in comparison to the Erdos-Renyi graph.

Question 1.4:

It is much harder for an epidemic to spread quickly ina a structured community. It is however a lot of easier to infect 1 distinct cluster. It is also easier for the infection to die out in that single distinct cluster too.

```
Erdos
100 trials resulted in epidemics
Mean proportion infected with condition : 94.768163
Mean proportion infected without conditioning : 94.768163
Preferential
100 trials resulted in epidemics
Mean proportion infected with condition : 87.925698
Mean proportion infected without conditioning : 87.925698
Actor
100 trials resulted in epidemics
Mean proportion infected with condition : 63.135347
Mean proportion infected without conditioning : 63.135347
```

There is no relative impact of targeting high-degree nodes increased by increasing number of nodes infected at the beginning. This is because 10 nodes make all trials go to 100 trials (completion) regardless. This is because higher infected node count means more infection and once the threshold is reached, it is simply impossible for the whole graph to not be infected.