GRADUATE STUDENT STAT 840 A4

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Problem 2

a)

```
library(igraph)
```

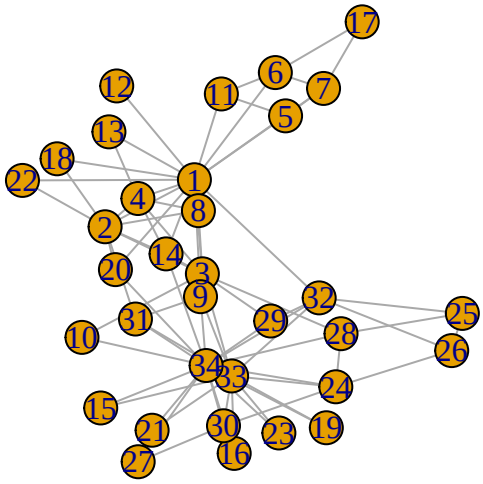
```
##
## Attaching package: 'igraph'
```

```
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
```

```
## The following object is masked from 'package:base':
##
##     union
```

```
zachary_dir = '/home/chad/Desktop/skool/840/zachary.txt'
data = read.table(zachary_dir)
data = data[,c(1,2)] # remove weights column
g = graph_from_edgelist(as.matrix(data), directed=FALSE)

# draw the graph, find diameter of graph
# https://r.igraph.org/reference/plot.common.html?q=draw#null
plot.igraph(g)
```

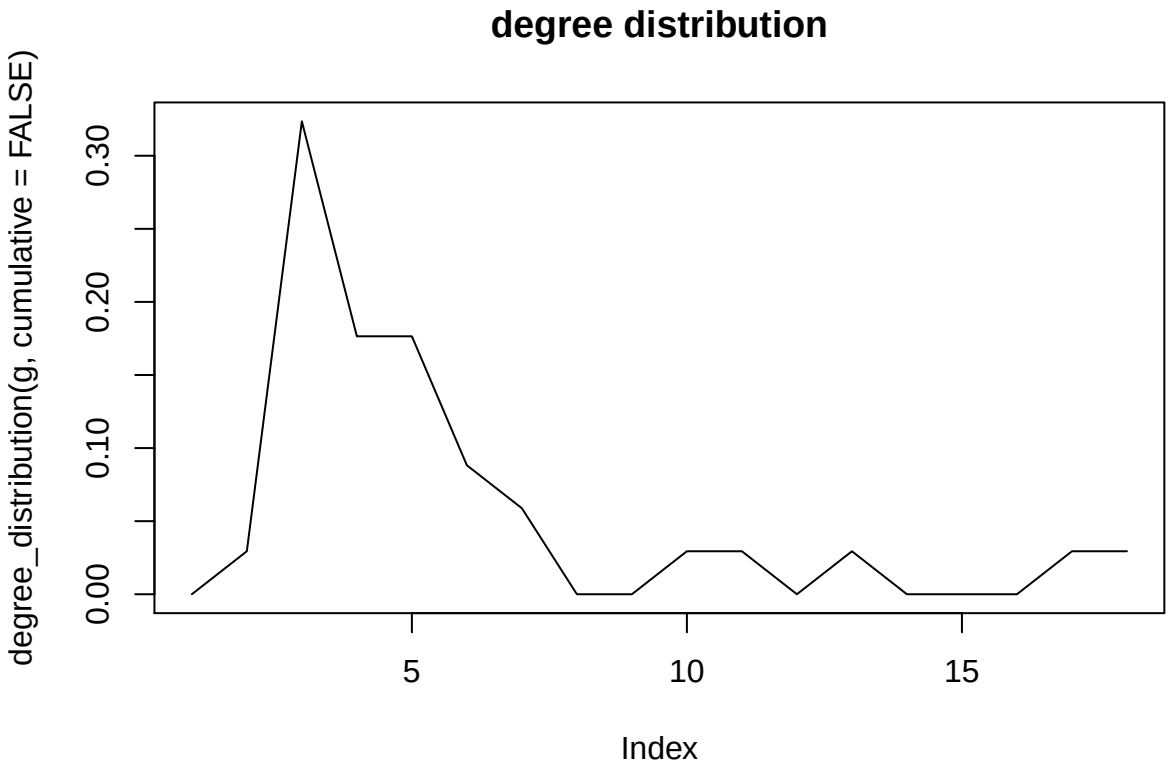



```
# https://r.igraph.org/reference/diameter.html?q=diameter#null
diameter(g, directed = FALSE)
```

```
## [1] 5
```

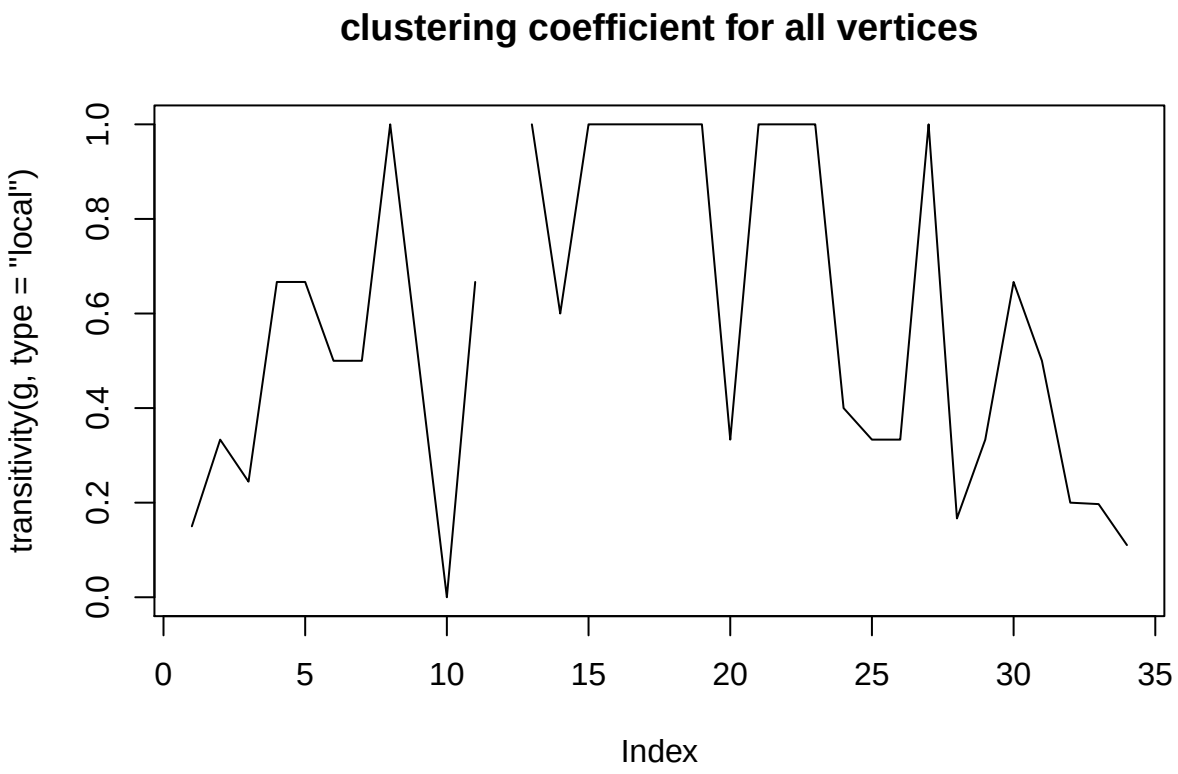
b)

```
# find the degree distribution
# https://r.igraph.org/reference/degree.html?q=degree%20distrib#null
plot(degree_distribution(g, cumulative=FALSE), type='l', main='degree distribution')
```



c)

```
# find clustering coefficients of all vertices and for the graph
# https://r.igraph.org/reference/transitivity.html?q=clustering%20coeff#null
# number 12 is NAN because it only has one neighbor
# clustering coefficient for all vertices
plot(transitivity(g, type="local"), type='l', main='clustering coefficient for all vertices')
```

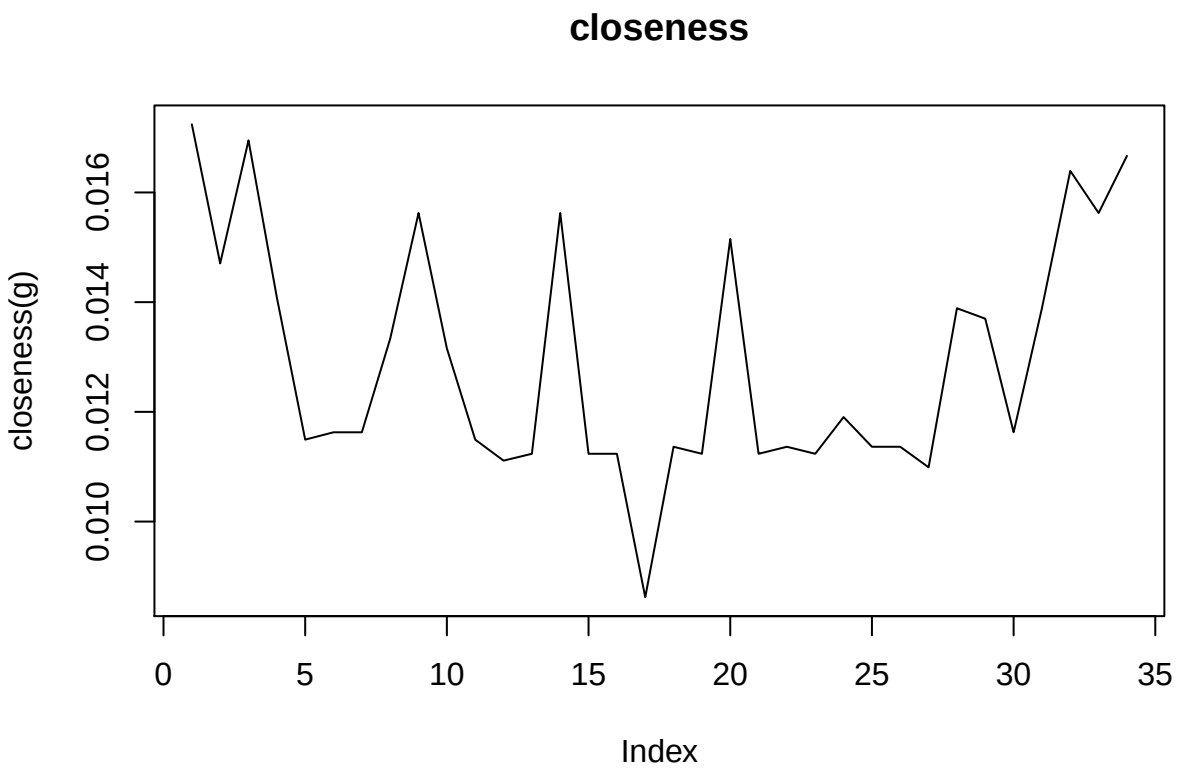



```
# clustering coefficient for entire graph
transitivity(g, type = "global")
```

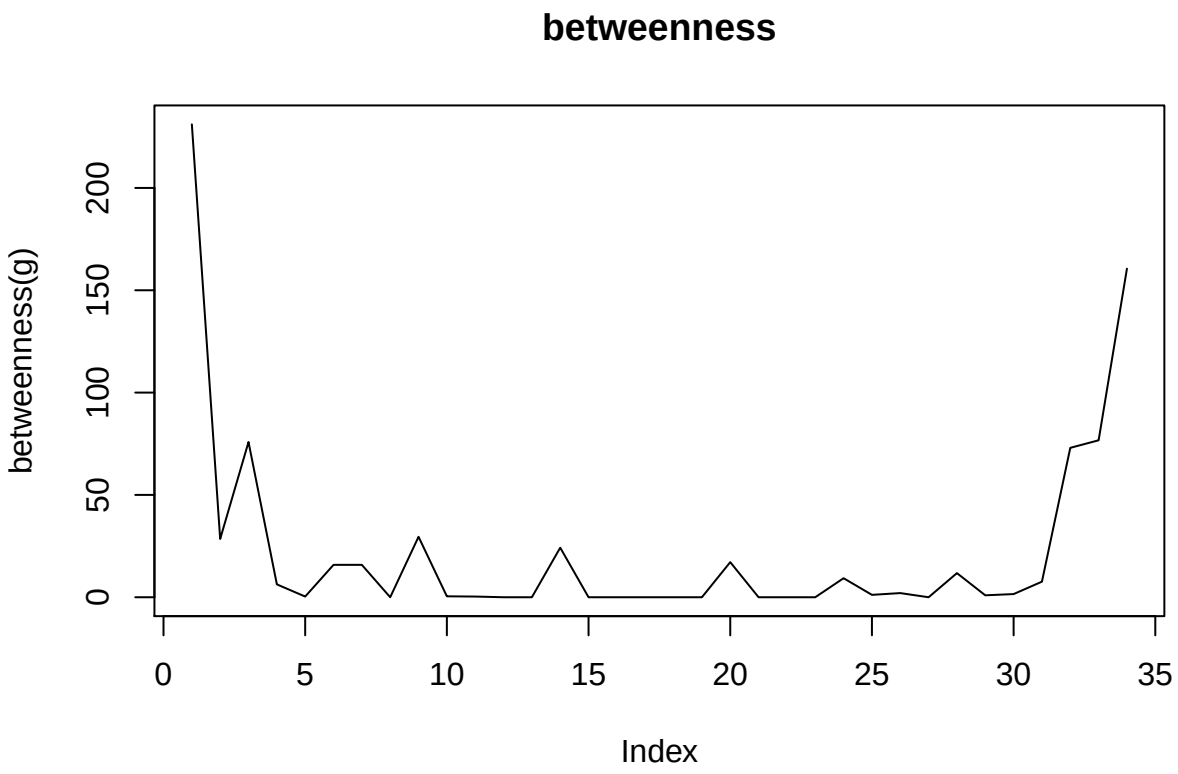
```
## [1] 0.2556818
```

d)

```
# find closeness and betweenness centralities of the vertices
# https://r.igraph.org/reference/closeness.html?q=closeness#null
plot(closeness(g), type='l', main='closeness')
```




```
# https://r.igraph.org/reference/betweenness.html?q=betweenness#null
plot(betweenness(g), type='l', main='betweenness')
```


betweenness
betweenness(g)
0
50
100
150
200
0
5
10
15
20
25
30
35
Index