



Using David Marchette graph Package in R

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Agenda

- Installing the package

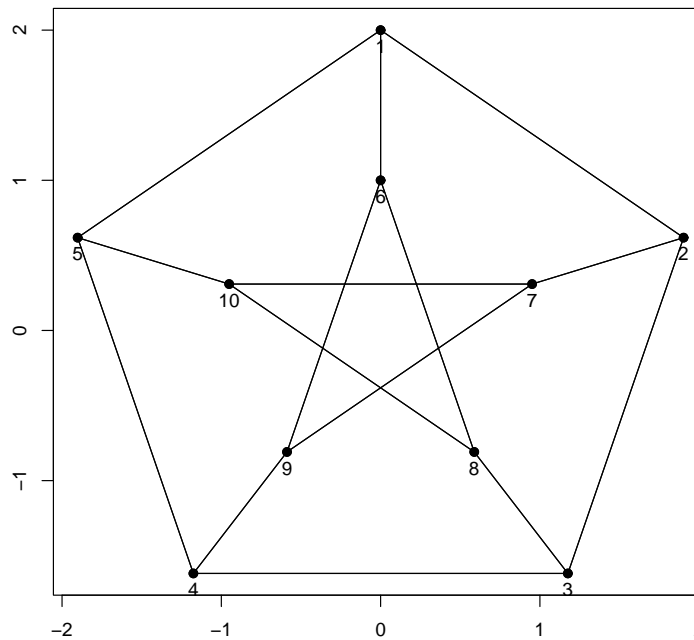


Installation

- Obtain Package from the Course Website or Via Email
- Under Linux We Execute at the Command Line
- R CMD INSTALL graph_0.3-23.0.tar.gz

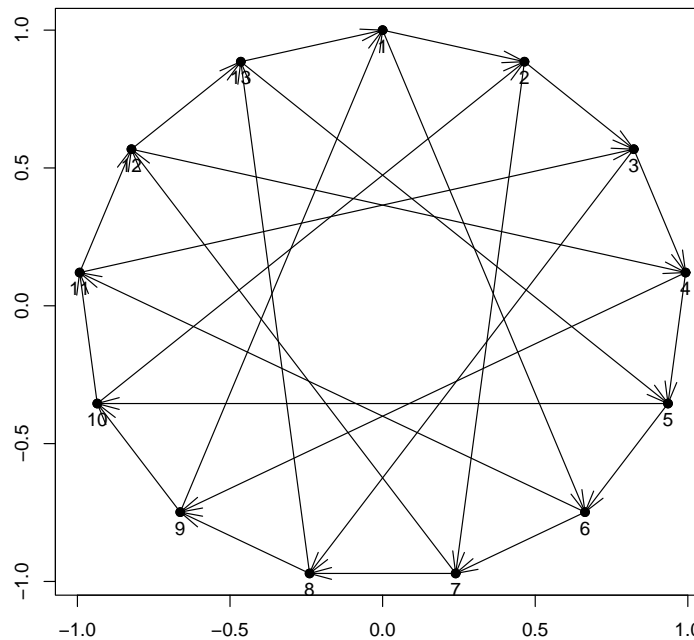
Our First Graph

- `library(graph)`
- `g=petersen()`
- `plot(g)`



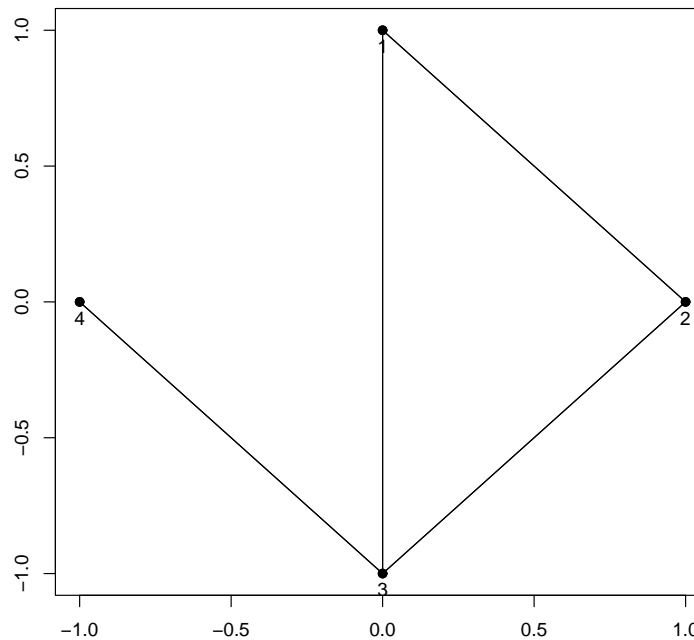
The Circulant Graph

- `library(graph)`
- `g=circulant(n=13,C=c(1,5))`
- `plot(g)`



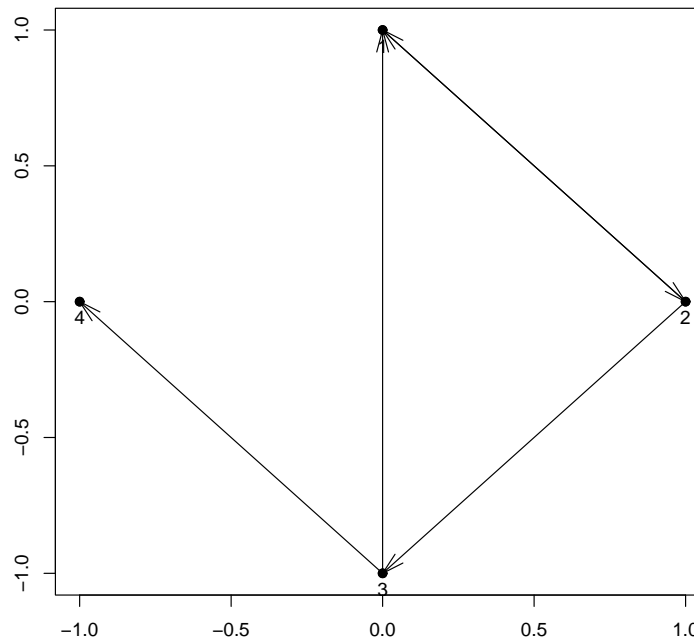
From an Adjacency Matrix to a Graph

```
g.adj = matrix(c(0,1,1,0,1,0,1,0,1,1,0,1,0,0,1,0), ncol = 4, byrow=TRUE)  
g = as.graph(g.adj)  
plot(g)
```



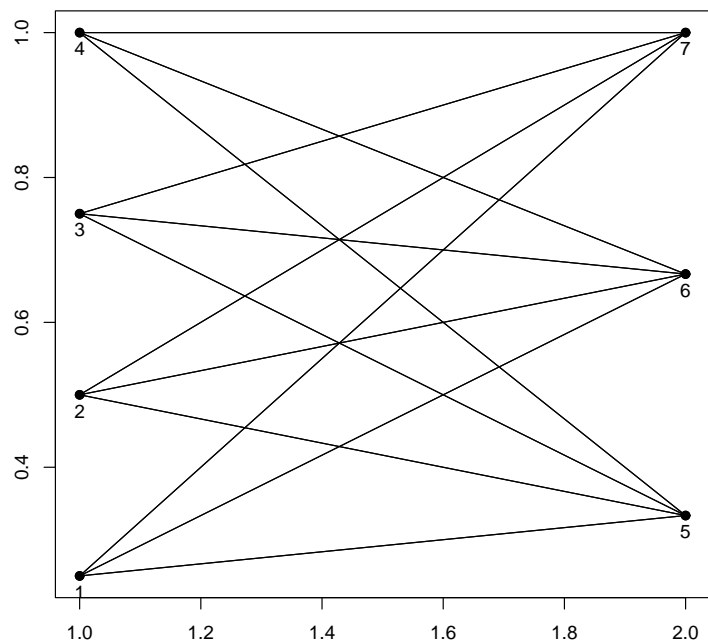
From an Adjacency Matrix to a DiGraph

```
AD.g = matrix(c(0,1,0,0,1,0,1,0,1,0,0,1,0,0,0,0),ncol=4, byrow=TRUE)
g = as.digraph(AD.g)
plot(g)
dev.print(postscript,file='PICS/mydigraph.ps')
```



The Bipartite Graph $K_{4,3}$

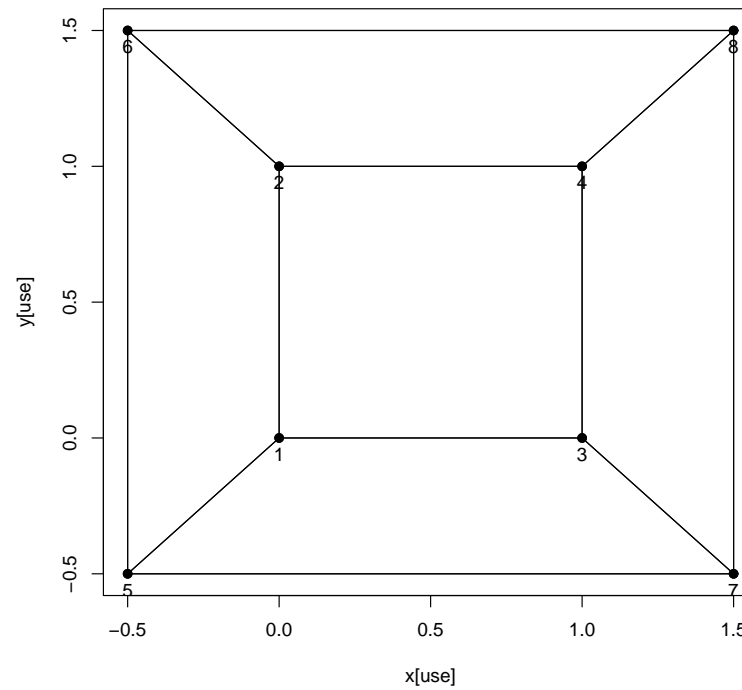
```
plot(k34,mode='bipartite',parts = c(1,1,1,1,2,2,2))
```



The Cube

```
g = cube()
```

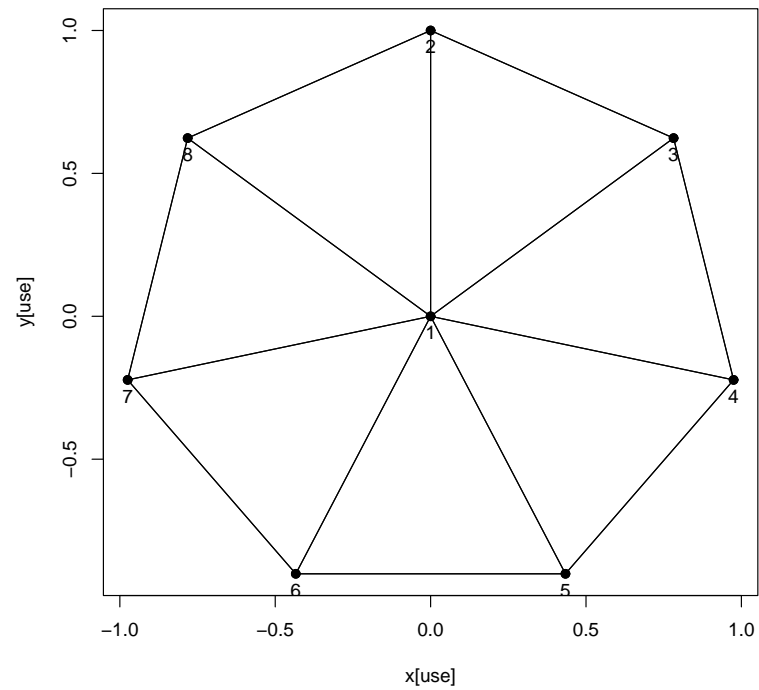
```
plot(g)
```



The Cube

```
g = wheel(8)
```

```
plot(g)
```





geodesic.dist()

Description

Find the geodesic distances between all pairs of vertices.

Usage

```
geodesic.dist(g)
```

Arguments

g A graph.

Value

a matrix of geodesic distances.

Extracting the Adjacency Matrix

```
g.adj = matrix(c(0,1,1,0,1,0,1,0,1,1,0,1,0,0,1,0), ncol = 4, byrow=TRUE)
```

```
g = as.graph(g.adj)
```

```
g.adj
```

```
[, 1][, 2][, 3][, 4]
```

```
[1,] 0 1 1 0
```

```
[2,] 1 0 1 0
```

```
[3,] 1 1 0 1
```

```
[4,] 0 0 1 0
```

```
g.new.adj = adjacency.matrix(g)
```

```
g.new.adj
```

```
[, 1][, 2][, 3][, 4]
```

```
[1,] 0 1 1 0
```

```
[2,] 1 0 1 0
```

```
[3,] 1 1 0 1
```

```
[4,] 0 0 1 0
```



clique.number()

Description

finds the size of the maximum clique in the graph.

Usage

```
clique.number(g, U, size=0,m=0)
```

Arguments

g a graph

U,size,m only used by the recursion.

Value

returns the size of the maximum clique.

This can be 1 or 2, so technically this should be checked if one is pedantic about the definition of clique.



incidence.matrix()

Description

Extract the incidence matrix from an object of class graph.

Usage

```
incidence.matrix(g)
```

Arguments

g a graph object.

Value

the incidence matrix.



interval.graph()

Description

an interval graph defined by a matrix of intervals.

Usage

```
interval.graph(intervals)
```

Arguments

intervals An n by 2 matrix of intervals. Each row corresponds to the endpoints of the interval.

Value

a graph.



isConnected()

Description

determines whether the graph is connected.

Usage

```
isConnected(g, mode = "weak")
```

Arguments

g a graph.

mode either "weak" or "strong".

Value

a logical.