# Network Science Homework 5

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**Assignment Description:** Select a real-world network, apply one of the community detection methods, and visualize the communities.

```
library(igraph)
library(tidyverse)
library(ggplot2)
```

# **Iceland** Network Dataset

“This is a network of sexual contacts of male homosexuals in Iceland, collected in 1992.”

*Data Source: The Konnect Project (http://konect.cc/networks/moreno_iceland/)*

# Data Import

*Find a real-world network.*

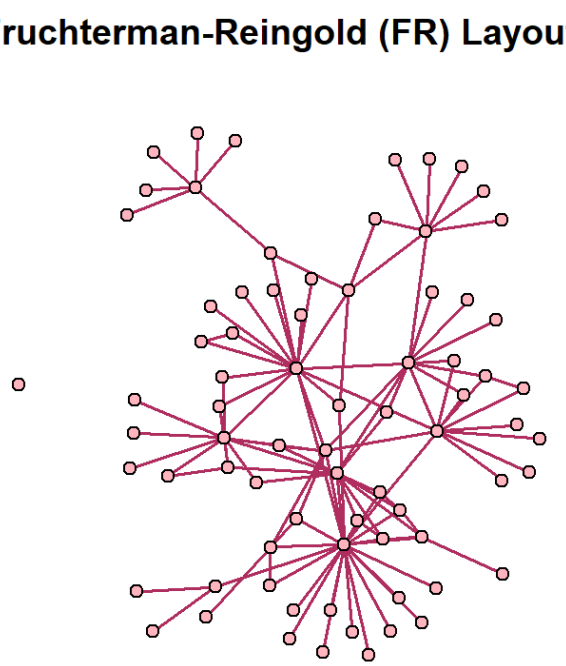
Here we are pulling in the physicians network described above.

```
iceland =
  readr::read_delim("data/iceland/out.iceland", skip = 1) |>
  janitor::remove_empty(which = "cols") |>
  janitor::clean_names() |>
  as.matrix() |>
  graph_from_edgelist()
```

# Basic Analysis/Visualization

There are **75 nodes** and **113 edges** in this network. Here is a visualization of the network using the FR layout. I tried the KK layout as well, but ultimately felt FR yielded a more visually organized result.

```
plot(iceland,
     layout=layout_with_fr,
     vertex.label = NA,
     vertex.size = 5,
     vertex.color = "lightpink",
     edge.width = 1.5,
     edge.color = "maroon",
     edge.arrow.size = 0,
     main = "Fruchterman-Reingold (FR) Layout")
```




# Community Detection

**Greedy Algorithm**

The documentation for the network says that it is undirected. However, igraph recognizes the iceland network as being directed, so we will pass it into the `cluster_fast_greedy()` function as an undirected graph, using the `as_undirected()` function.

```
is_directed(iceland)
```

```
## [1] TRUE
```

```
ic = cluster_fast_greedy(as_undirected(iceland))
```

Using the greedy algorithm, how many communities are in the network?

```
length(ic)
```

```
## [1] 9
```

What are the sizes of these communities?

```
sizes(ic)
```

```
## Community sizes
##  1  2  3  4  5  6  7  8  9
## 14 18  9  6  9  7  8  3  1
```

Let's visualize the communities.

```
plot(ic, iceland,
     vertex.size = 5,
     vertex.label = NA,
     edge.arrow.size = 0.3,
     #layout = layout_with_fr
     )
```