create simple graphs to test Consensus Community Detection

```
make_clique <- function(clique_size, comm_label) {
  G <- graph.empty(n = clique_size)
  edges <- t(combn(1:clique_size, 2))
  for (e in 1:nrow(edges)) {
      G <- add_edges(G, edges[e, ])
  }
  V(G)$community <- comm_label
  return(as.undirected(G))
}
```

```
make_ring_of_cliques <- function(num_cliques,
                                 clique_size,
                                 add_center = TRUE,
                                 add_bridges = TRUE,
                                 filename = '') {

    G <- as.undirected(graph.empty())

  for (i in 1:num_cliques) {
    next_clique <- make_clique(clique_size, comm_label = paste0("C", i))
    G <- G + next_clique
  }

   b <- vcount(G)
  if (add_bridges) {
    G <- add_vertices(G, num_cliques)
  }


  for (j in 1:(num_cliques)) {
    b <- b + 1
    b_start <- (j-1) * clique_size +1
    b_end <- b_start + clique_size +1
    if (b_end > (clique_size * num_cliques)) {b_end <- 2}
    if (add_bridges) {

      G <- add_edges(G, c(b_start, b))
      G <- add_edges(G, c(b, b_end))
      V(G)$community[b] <- paste0("B", j)
    } else {
      G <- add_edges(G, c(b_start, b_end))
    }

  }

  if (add_center) {
```

```
    G <- add_vertices(G, 1)
    id_center <- vcount(G)
    V(G)$community[id_center] <- "A"
    for (j in 1:(num_cliques)) {
      c_start <- (j-1) * clique_size +3
      G <- add_edges(G, c(c_start , id_center))
    }

  }


  E(G)$weight <- 1.0
  V(G)$id <- seq(1:vcount(G))
  V(G)$name <- V(G)$id


  if (filename != '') {write_graph(G, paste0(filename, '.gml'), format = 'gml')}

  return(G)

}
```

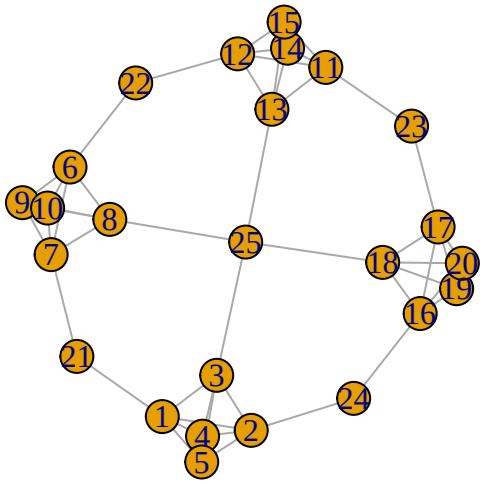
```
roc84bc <- make_ring_of_cliques(
    num_cliques = 8,
    clique_size = 4,
    add_center = TRUE,
    add_bridges = TRUE,
    filename = ''
)
save(roc84bc, file = "data/roc84bc.rda")
print(roc84bc)
```

```
## IGRAPH 3de67a0 UNW- 41 72 --
## + attr: community (v/c), id (v/n), name (v/n), weight (e/n)
## + edges from 3de67a0 (vertex names):
##  [1]  1-- 2  1-- 3  2-- 3  1-- 4  2-- 4  3-- 4  5-- 6  5-- 7  6-- 7  5-- 8
## [11]  6-- 8  7-- 8  9--10  9--11 10--11  9--12 10--12 11--12 13--14 13--15
## [21] 14--15 13--16 14--16 15--16 17--18 17--19 18--19 17--20 18--20 19--20
## [31] 21--22 21--23 22--23 21--24 22--24 23--24 25--26 25--27 26--27 25--28
## [41] 26--28 27--28 29--30 29--31 30--31 29--32 30--32 31--32  1--33  6--33
## [51]  5--34 10--34  9--35 14--35 13--36 18--36 17--37 22--37 21--38 26--38
## [61] 25--39 30--39 29--40  2--40  3--41  7--41 11--41 15--41 19--41 23--41
## [71] 27--41 31--41
```

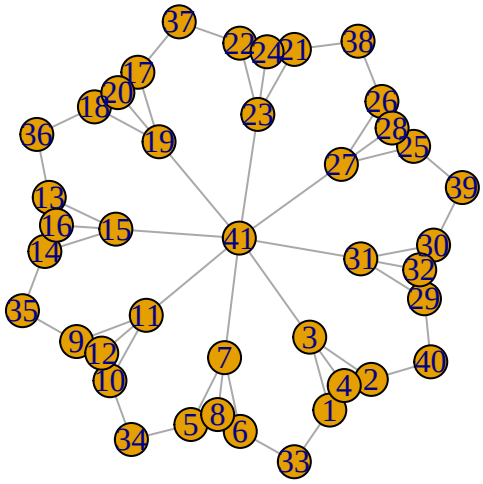
```
roc45bc <- make_ring_of_cliques(
    num_cliques = 4,
    clique_size = 5,
    add_center = TRUE,
    add_bridges = TRUE,
    filename = ''
)
save(roc45bc, file = "data/roc45bc.rda")
print(roc45bc)
```

```
## IGRAPH 3ded557 UNW- 25 52 --
## + attr: community (v/c), id (v/n), name (v/n), weight (e/n)
## + edges from 3ded557 (vertex names):
##  [1]  1-- 2  1-- 3  2-- 3  1-- 4  2-- 4  3-- 4  1-- 5  2-- 5  3-- 5  4-- 5
## [11]  6-- 7  6-- 8  7-- 8  6-- 9  7-- 9  8-- 9  6--10  7--10  8--10  9--10
## [21] 11--12 11--13 12--13 11--14 12--14 13--14 11--15 12--15 13--15 14--15
## [31] 16--17 16--18 17--18 16--19 17--19 18--19 16--20 17--20 18--20 19--20
## [41]  1--21  7--21  6--22 12--22 11--23 17--23 16--24  2--24  3--25  8--25
## [51] 13--25 18--25
```

```
plot(roc45bc)
```




```
plot(roc84bc)
```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