

R12: Graphs

General Instructions:

- 1- Create a C project in eclipse called R12
- 2- Extract the file R12.zip into a folder of your choice at your machine. Copy the files into the R12 project.
- 3- Rename: graph_components_template.txt to graph_components.c
- 4- Rename graph_template.txt to graph.c
- 5- Create the following two files
 - a. graph_components.h
 - b. graph.h
- 6- Enter your credentials on top of the file: "graph.c".
- 7- You only need to submit "graph.c" when you are done.

Overview:

In this activity, you are going to provide an implementation of Graph data structure using the Adjacency Matrix method. The graph is assumed to be undirected and non-weighted. Loops are not allowed in the graph.

Part 1: Graph Components

Define the Vertex and Edge structs, then implement the following functions:

```
Vertex* create_vertex(int num, char *name);
void print_vertex(Vertex *v);
void destroy_vertex(Vertex **v);
int is_equal_vertex(Vertex *v1, Vertex *v2);

Edge* create_edge(Vertex *v1, Vertex *v2, int w, int d);
void print_edge(Edge *e);
void destroy_edge(Edge **e);
int is_equal_edge(Edge *e1, Edge *e2);
```

Part 2: Graph ADT:

Implement the following functions:

```
Graph* create_graph(int w, int d);  
void destroy_graph(Graph **g);  
void print_graph(Graph *g);  
  
int is_null_graph(Graph *g);  
int is_empty_graph(Graph *g);  
  
int add_vertex_graph(Graph *g, Vertex *v);  
int has_vertex_graph(Graph *g, Vertex *v);  
  
int add_edge_graph(Graph *g, Edge *e);  
int has_edge_graph(Graph *g, Edge *e);  
int remove_edge_graph(Graph *g, Edge *e);
```