CSE 1224 - Homework 5 - Due Friday, November 11 at 11:59 PM

1) Write a function called *star_d*(n) that takes a positive integer greater than 2 as an argument. The function should return a dictionary representation of a star graph. In a star graph, every node is adjacent to node 0 and no other nodes.

For example, *star_d*(5) should return

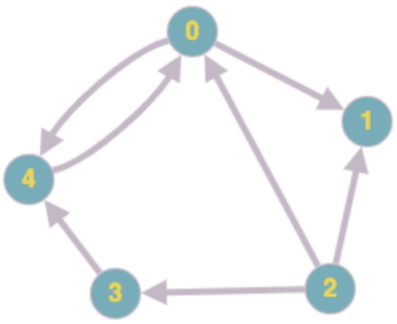
```
{0 : [1, 2, 3, 4],
 1 : [0],
 2 : [0],
 3 : [0],
 4 : [0]}
```

2) Write a function called *star_m*(n) that returns a n by n matrix representing a star graph with 3 or more vertices.

For example, *star_m*(5) should return

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

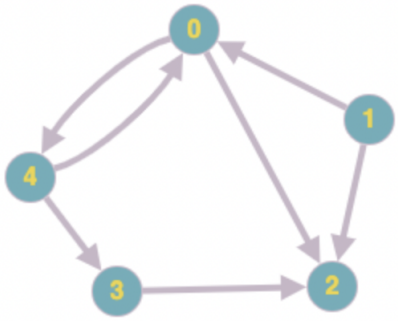
3) In a **directed graph**, the edges have a direction. For example, here is a directed graph on 5 vertices.



The matrix representation of the directed graph above is shown below.

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

The **transpose** of a directed graph has the direction of its edges reversed. For example, here is the transpose of the graph above, along with its matrix representation.




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

Write a function called *transpose_m*(*mat*) that takes an n by n matrix representation of a directed graph as an argument and returns a new matrix representing the transpose of the argument.

4) Write a function called *transpose_d*(*di*) that rakes a dictionary representation of a directed graph as an argument and returns a new dictionary representing that transpose of the argument. For example, if the following dictionary is passed as an argument to the function,

```
{0 : [1, 2],
 1 : [],
 2 : [0, 3, 4],
```

```
 3 : [2],
 4 : [0, 3]}
```

then the function should return

```
{0 : [2, 4],
 1 : [0],
 2 : [0, 3],
 3 : [2, 4],
 4 : [2]}
```