University of Mila – Institute of Mathematics and Computer Science
Computer Science Department – 2nd Year Computer Science – Graph Theory
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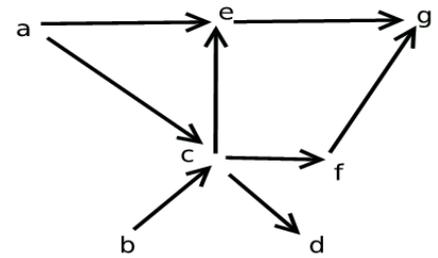
Trees and Forests

Exercise 1:

Given a graph G:

- Show by the 2 algorithms that G is circuitless.

Exercise 2:

In multi-tasking systems, the competition for resources can lead to a situation known as a deadlock. To visualize and analyze these situations, we use an allocation graph.

- Vertices: Represent either processes or resources.
- Edges: Show the relationships between processes and resources.
- A directed edge from a process to a resource indicates the process is requesting the resource.
- A directed edge from a resource to a process indicates the resource is allocated to the process.

R3 is allocated to P5
P2 is waiting for R3, R4 and R5
R4 is allocated to P3
P3 is waiting for R5
R5 is allocated to P4
P4 is waiting for R2
R2 is allocated to P1
P1 is waiting for R1
R1 is allocated to P2

1. Draw the allocation graph based on the given scenario.
2. Analyze the graph to determine if a deadlock exists.

Exercise 3:

A company wants to install a data transmission network between its central agency located in area A and 7 of its new buildings.

- What lines should be built to minimize the cost of the network?

   (Using 3 different ways)

   The following table shows the known distances (km) between buildings.

	A	B	C	D	E	F	G
A							
B	5						
C	18	17					
D	9	11	27				
E	13		23	20			
F	7			15	15		
G					30	10	