

INSTITUTO FEDERAL  
GOIÁS

**INSTITUTO FEDERAL DE GOIÁS**  
**CÂMPUS GOIÂNIA**  
**BACHARELADO EM SISTEMAS DE INFORMAÇÃO**  
**TEORIA GERAL DA ADMINISTRAÇÃO**

Nome do Aluno: Luiz Antônio Rodrigues dos Santos

Data: 18/06/2018

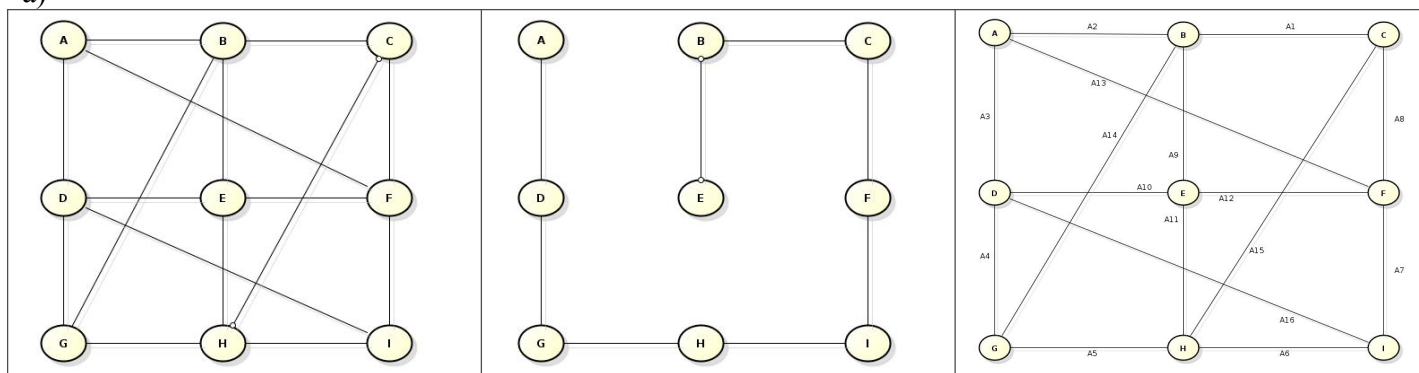
Prof. Renan Rodrigues

## Lista de Exercícios Grafos

1) Para os grafos abaixo:

a) Construa a matriz de adjacência, matriz de incidência e lista de adjacência.

a)



a) Adjacência

	A	B	C	D	E	F	G	H	I	
A	0	1	0	1	0	1	0	0	0	A
B	1	0	1	0	1	0	1	0	0	B
C	0	1	0	0	0	1	0	1	0	C
D	1	0	0	0	1	0	1	0	1	D
E	0	1	0	1	0	1	0	1	0	E
F	1	0	1	0	1	0	0	0	1	F
G	0	1	0	1	0	0	0	1	0	G
H	0	0	1	0	1	0	1	0	1	H
I	0	0	0	1	0	1	0	1	0	I

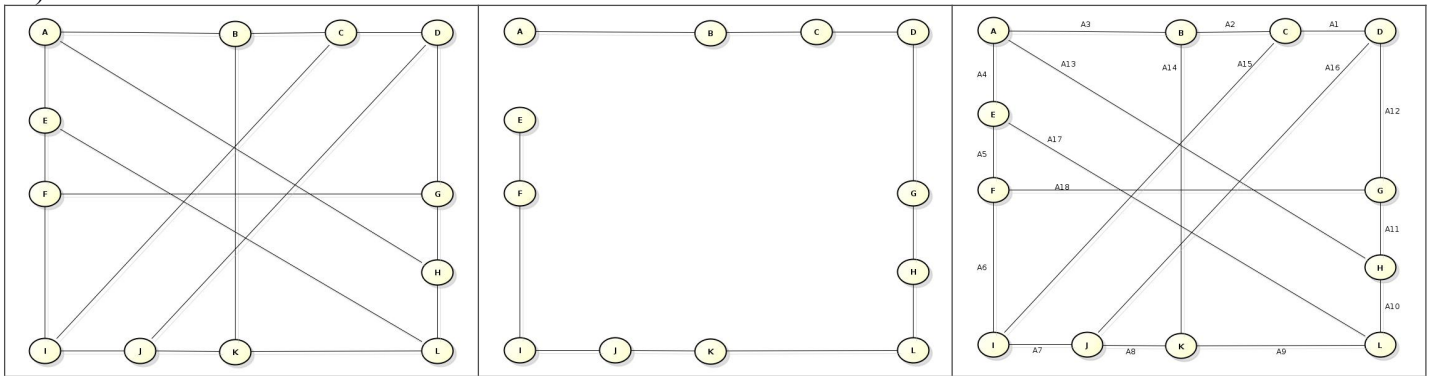
a) Lista de Adjacência

A	B --> D --> F
B	A --> C --> E --> G
C	B --> F --> H
D	A --> E --> G --> I
E	B --> D --> F --> H
F	A --> C --> E --> I
G	B --> D --> H
H	C --> E --> G --> I
I	D --> F --> H

a) Incidência

	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	
A	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	A
B	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	B
C	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	C
D	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	1	D
E	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	E
F	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	F
G	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	G
H	0	0	0	0	1	1	0	0	0	0	1	0	0	0	1	0	H
I	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	I

b)



b) Adjacência

	A	B	C	D	E	F	G	H	I	J	K	L	
A	0	1	0	0	1	0	0	1	0	0	0	0	A
B	1	0	1	0	0	0	0	0	0	0	1	0	B
C	0	1	0	1	0	0	0	0	1	0	0	0	C
D	0	0	1	0	0	0	1	0	0	1	0	0	D
E	1	0	0	0	0	1	0	0	0	0	0	1	E
F	0	0	0	0	1	0	1	0	1	0	0	0	F
G	0	0	0	1	0	1	0	1	0	0	0	0	G
H	1	0	0	0	0	0	1	0	0	0	0	1	H
I	0	0	1	0	0	1	0	0	0	1	0	0	I
J	0	0	0	1	0	0	0	0	1	0	1	0	J
K	0	1	0	0	0	0	0	0	0	1	0	1	K
L	0	0	0	0	1	0	0	1	0	0	1	0	L

b) Lista de Adjacência

A	B --> E --> H
B	A --> C --> K
C	B --> D --> I
D	C --> G --> J
E	A --> F --> L
F	E --> G --> I
G	D --> F --> H
H	A --> G --> L
I	C --> F --> J
J	D --> I --> K
K	B --> J --> L

L	E --> H --> K
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b) Incidência

	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17	a18	
A	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	A
B	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B
C	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	C
D	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	D
E	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	E
F	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	F
G	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	G
H	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	H
I	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	I
J	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	J
K	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	K
L	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	L

b) Execute a busca em profundidade (DFS), mostrando o conteúdo da pilha durante cada passo do algoritmo.

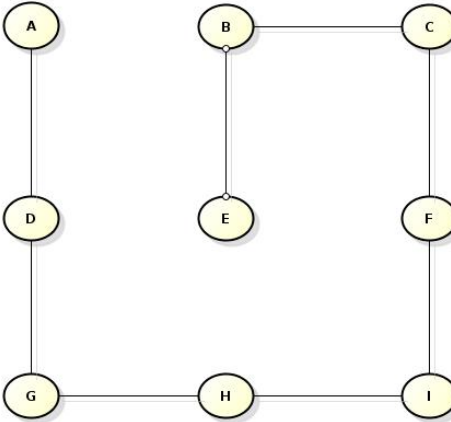
a)	b)																																																																																						
<table> <tr> <th>Evento</th><th>Pilha</th></tr> <tr><td>E(A)</td><td>A</td></tr> <tr><td>E(B)</td><td>AB</td></tr> <tr><td>E(C)</td><td>ABC</td></tr> <tr><td>E(F)</td><td>ABCF</td></tr> <tr><td>E(E)</td><td>ABCFE</td></tr> <tr><td>E(D)</td><td>ABCFED</td></tr> <tr><td>E(G)</td><td>ABCFEDG</td></tr> <tr><td>E(H)</td><td>ABCFEDGH</td></tr> <tr><td>E(I)</td><td>ABCFEDGHI</td></tr> <tr><td>D(I)</td><td>ABCFEDGH</td></tr> <tr><td>D(H)</td><td>ABCFEDG</td></tr> <tr><td>D(G)</td><td>ABCFED</td></tr> <tr><td>D(D)</td><td>ABCFE</td></tr> <tr><td>D(E)</td><td>ABCF</td></tr> <tr><td>D(F)</td><td>ABC</td></tr> <tr><td>D(C)</td><td>AB</td></tr> <tr><td>D(B)</td><td>A</td></tr> </table>	Evento	Pilha	E(A)	A	E(B)	AB	E(C)	ABC	E(F)	ABCF	E(E)	ABCFE	E(D)	ABCFED	E(G)	ABCFEDG	E(H)	ABCFEDGH	E(I)	ABCFEDGHI	D(I)	ABCFEDGH	D(H)	ABCFEDG	D(G)	ABCFED	D(D)	ABCFE	D(E)	ABCF	D(F)	ABC	D(C)	AB	D(B)	A	<table> <tr> <th>Evento</th><th>Pilha</th></tr> <tr><td>E(A)</td><td>A</td></tr> <tr><td>E(E)</td><td>AB</td></tr> <tr><td>E(C)</td><td>ABC</td></tr> <tr><td>E(D)</td><td>ABCD</td></tr> <tr><td>E(G)</td><td>ABCDG</td></tr> <tr><td>E(F)</td><td>ABCDGF</td></tr> <tr><td>E(E)</td><td>ABCDGFE</td></tr> <tr><td>E(L)</td><td>ABCDGFEL</td></tr> <tr><td>E(H)</td><td>ABCDGFELH</td></tr> <tr><td>D(H)</td><td>ABCDGFEL</td></tr> <tr><td>E(K)</td><td>ABCDGFELK</td></tr> <tr><td>E(J)</td><td>ABCDGFELKJ</td></tr> <tr><td>E(I)</td><td>ABCDGFELKJI</td></tr> <tr><td>D(I)</td><td>ABCDGFELKJ</td></tr> <tr><td>D(J)</td><td>ABCDGFELK</td></tr> <tr><td>D(K)</td><td>ABCDGFEL</td></tr> <tr><td>D(L)</td><td>ABCDGFE</td></tr> <tr><td>D(E)</td><td>ABCDGF</td></tr> <tr><td>D(F)</td><td>ABCDG</td></tr> <tr><td>D(G)</td><td>ABCD</td></tr> <tr><td>D(D)</td><td>ABC</td></tr> <tr><td>D(C)</td><td>AB</td></tr> <tr><td>D(B)</td><td>A</td></tr> <tr><td>D(A)</td><td>Fim</td></tr> </table>	Evento	Pilha	E(A)	A	E(E)	AB	E(C)	ABC	E(D)	ABCD	E(G)	ABCDG	E(F)	ABCDGF	E(E)	ABCDGFE	E(L)	ABCDGFEL	E(H)	ABCDGFELH	D(H)	ABCDGFEL	E(K)	ABCDGFELK	E(J)	ABCDGFELKJ	E(I)	ABCDGFELKJI	D(I)	ABCDGFELKJ	D(J)	ABCDGFELK	D(K)	ABCDGFEL	D(L)	ABCDGFE	D(E)	ABCDGF	D(F)	ABCDG	D(G)	ABCD	D(D)	ABC	D(C)	AB	D(B)	A	D(A)	Fim
Evento	Pilha																																																																																						
E(A)	A																																																																																						
E(B)	AB																																																																																						
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D(C)	AB																																																																																						
D(B)	A																																																																																						
D(A)	Fim																																																																																						

- c) Execute a busca em largura (BFS), mostrando o conteúdo da fila durante cada passo do algoritmo.

a)		b)	
Evento	Fila	Evento	Fila
E(A)	A	E(A)	A
E(B)	AB	E(B)	AB
E(D)	ABD	E(E)	ABE
E(F)	ABDF	E(H)	ABEH
D(A)	BDF	D(A)	BEH
E(C)	BDFC	E(C)	BEHC
E(E)	BDFCE	E(K)	BEHCK
E(G)	BDFCEG	D(B)	EHCK
D(B)	DFCEG	E(F)	EHCKF
E(I)	DFCEGI	E(L)	EHCKFL
D(D)	FCEGI	D(E)	HCKFL
D(F)	CEGI	E(G)	HCKFLG
E(H)	CEGIH	D(H)	CKFLG
D(C)	EGIH	E(D)	CKFLGD
D(E)	GIH	E(I)	CKFLGDI
D(G)	IH	D(C)	KFLGDI
D(I)	H	E(J)	KFLGDIJ
D(H)	Fim	D(K)	FLGDIJ
		D(F)	LGDIJ
		D(L)	GDIJ
		D(G)	DIJ
		D(D)	IJ
		D(I)	J
		D(J)	Fim

- d) Execute o algoritmo de árvores geradoras mínimas e mostre a versão das árvores com o número mínimo de arestas (teste de mesa).

a)



Evento	Pilha
E(A)	A
E(D)	AD
E(G)	ADG
E(H)	ADGH
E(I)	ADGHI
E(F)	ADGHIF
E(C)	ADGHIFC
E(B)	ADGHIFCB
E(E)	ADGHIFCBE
D(E)	ADGHIFC
D(C)	ADGHIF
D(F)	ADGHI
D(I)	ADGH
D(H)	ADG
D(G)	AD
D(D)	A
D(A)	Fim

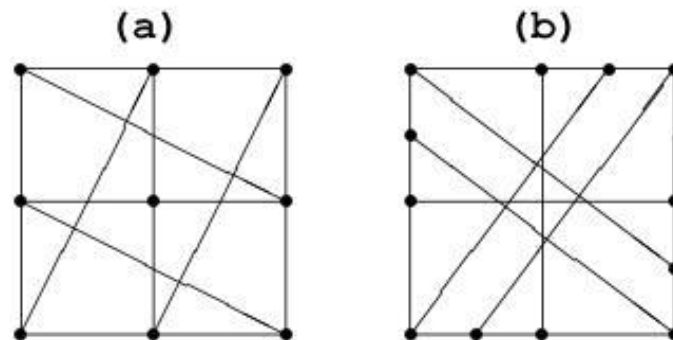
Caminho
AD
AD DG
AD DG GH
AD DG GH HI
AD DG GH HI IF
AD DG GH HI IF FC
AD DG GH HI IF FC CB
AD DG GH HI IF FC CB BE

B)

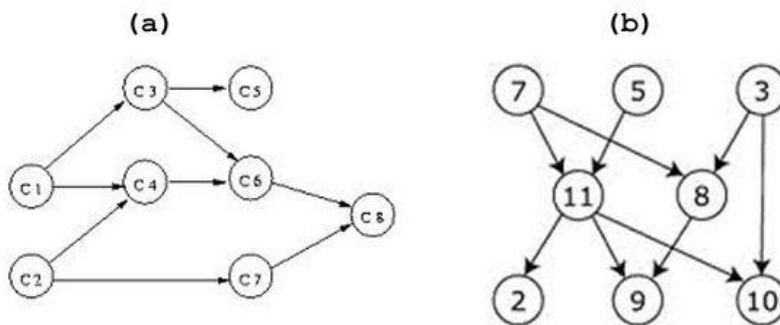
Evento	Pilha
E(A)	A
E(B)	AB
E(C)	ABC
E(D)	ABCD
E(G)	ABCDG
E(H)	ABCDGH
E(L)	ABCDGHL
E(K)	ABCDGHLK
E(J)	ABCDGHLKJ
E(I)	ABCDGHLKJI
E(F)	ABCDGHLKJIF
E(E)	ABCDGHLKJIFE
D(E)	ABCDGHLKJIF
D(F)	ABCDGHLKJI
D(I)	ABCDGHLKJ
D(J)	ABCDGHLK
D(K)	ABCDGHL
D(L)	ABCDGH
D(H)	ABCDG
D(G)	ABCD
D(D)	ABC
D(C)	AB
D(B)	A
D(A)	Fim

Caminho
AB
AB BC
AB BC CD
AB BC CD DG
AB BC CD DG GH
AB BC CD DG GH HL
AB BC CD DG GH HL LK
AB BC CD DG GH HL LK KJ
AB BC CD DG GH HL LK KJ JI
AB BC CD DG GH HL LK KJ JI IF
AB BC CD DG GH HL LK KJ JI IF FE

- e) Utilize a código disponível no Moodle para Árvore Gerados Mínimas e insira o grafo abaixo para executar o programa. Apresente a versão da árvore com o número mínimo de arestas após a execução do programa. **NÃO DEU TEMPO**



- 2) Para os grafos abaixo, execute o algoritmo de ordenação topológica, anotando cada passo do algoritmo.



a) C1 C2 C7 C4 C3 C6 C5 C8

	C1	C2	C3	C4	C5	C6	C7	C8	Evento	Fila	
C1			1	1					R(C8)	C8	
C2				1			1		R(C5)	C5	
C3					1	1			R(C6)	C6	
C4						1			R(C3)	C3	
C5									R(C4)	C4	
C6									R(C7)	C7	
C7								1	R(C2)	C2	
C8								1	R(C1)	C1	

b) C7 C5 C11 C3 C8 C10 C9 C2

	C1	C2	C3	C4	C5	C6	C7	C8	Evento	Fila	
C1									R(C2)	C2	
C2									R(C9)	C9	
C3									R(C10)	C10	
C4									R(C8)	C8	
C5									R(C3)	C3	
C6									R(C11)	C11	
C7									R(C5)	C5	
C8									R(C7)	C7	

- 3) Implemente a busca em largura tendo como base o código disponível no Moodle para a busca em profundidade para grafos não-direcionados. Modifique o código da Pilha para transformá-lo em uma Fila. **NÃO DEU TEMPO**