Homework IV: Indirect Connections and Matrices

Indirect Connections

Consider the graph shown in Figure 1:

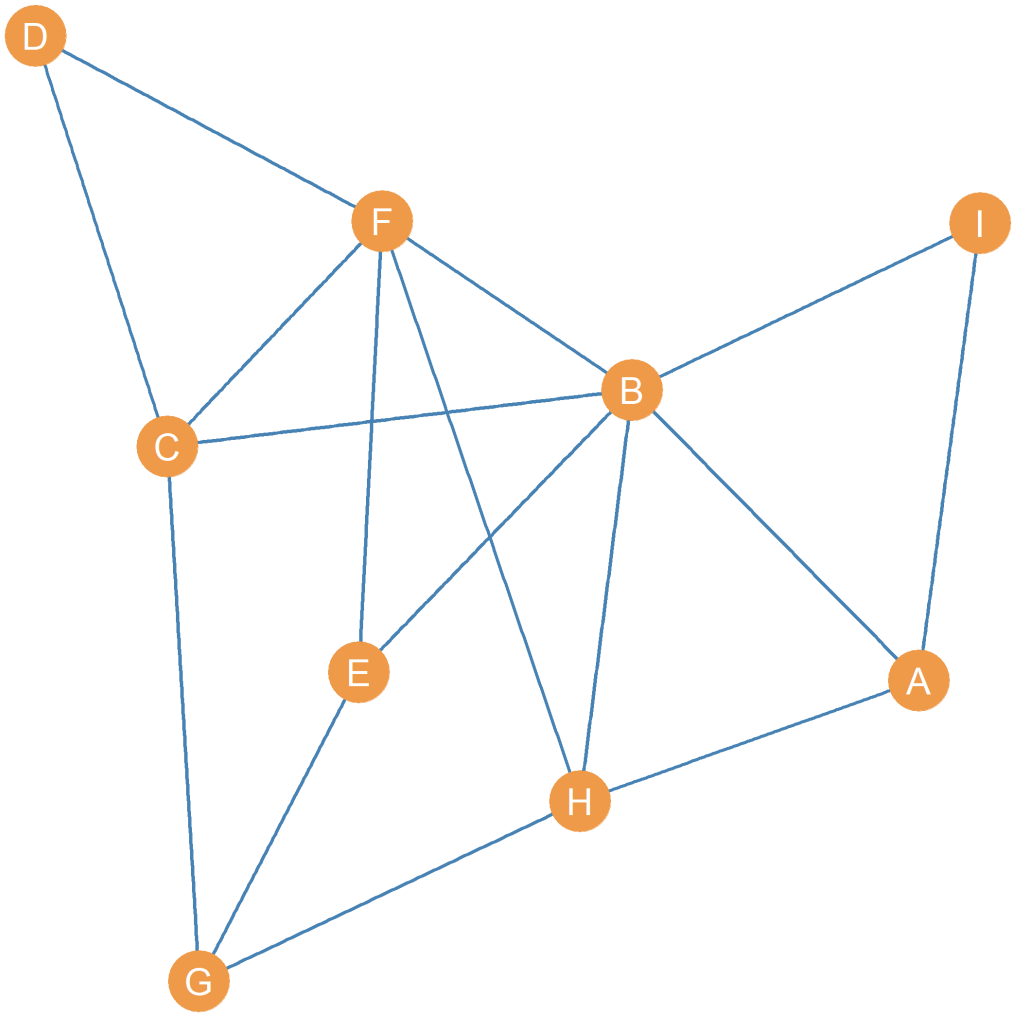

Figure 1: An undirected graph.

1. Write down *all* the **paths** of length five (l = 5) connecting node *G* and node *F*:

2. Write down *all* the **paths** of length two (l = 2) featuring node *B* as the **inner node**:

3. Write down all the **shortest paths** connecting nodes *G* and *I*:

4. Write down one **cycle** of length six that starts and ends with node *C*:

Directed Paths

Consider the graph shown in Figure 2:

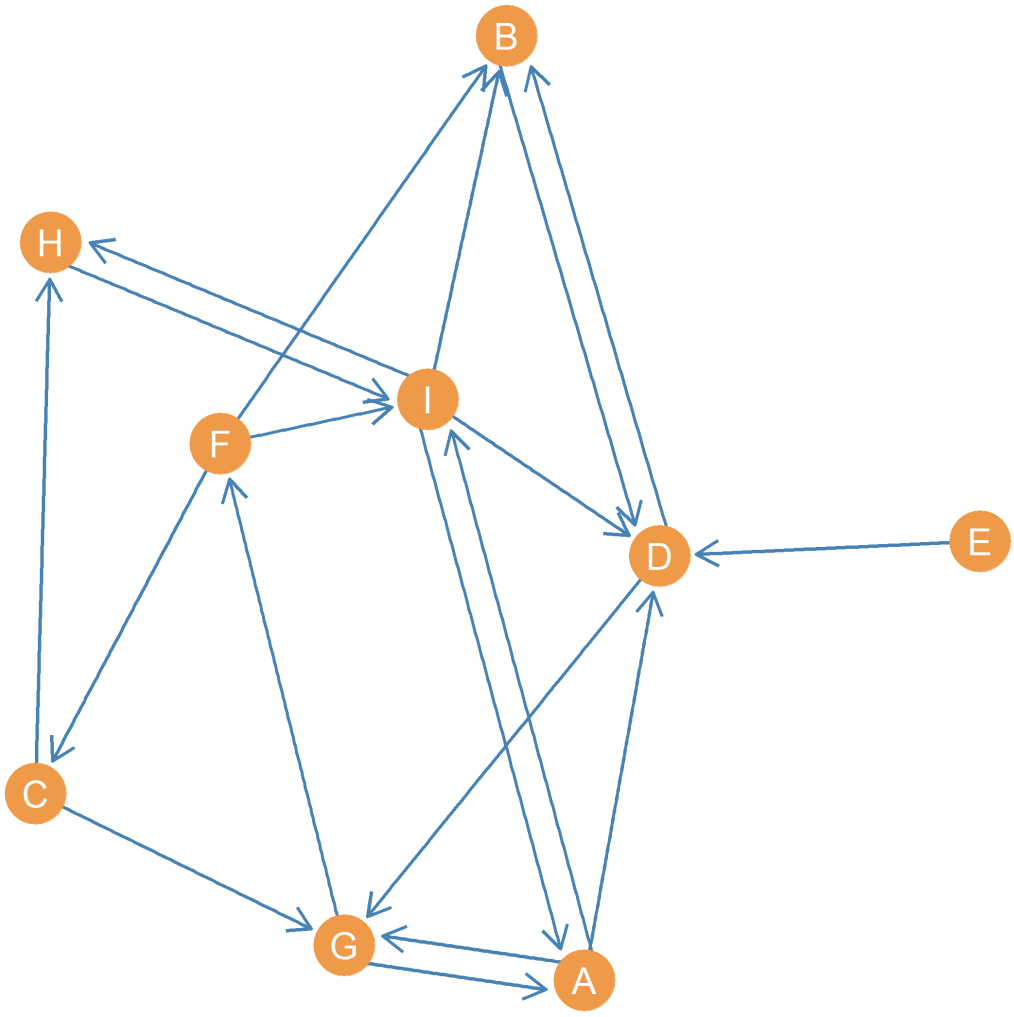

Figure 2: A directed graph.

1. Write down *all* the **directed path(s)** going *from* node *G to* node *B*:

2. What is the length of the **shortest directed path(s)** connecting going *from* node *A to* node *C*?

3. If *B* wanted to send a message to *H* in the most efficient way, how many intermediaries would *B* have to use?

4. Write down a directed **cycle** of length five (l = 5) starts and ends with node *D*:

Matrices

- In the matrix below, write down the cell entries for the **adjacency matrix** corresponding to the graph shown in Figure 2:

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

- In the matrix below, write down the cell entries for the **reachability matrix** corresponding to the graph shown in Figure 2:

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

- In the matrix below, write down the cell entries **geodesic distance matrix** corresponding to the graph shown in Figure 1:

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

What is the **diameter** of the graph shown in Figure 1?