Is Coordination needed?
Round 1
k = 2: 5 honest, 2 byzantine generals, on tie: atack

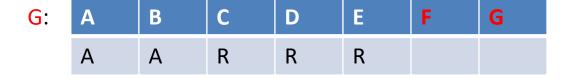A: Attack

B: Attack

C: Retreat

D: Retreat

E: Retreat

F:

A	B	C	D	E	F	G
A	A	R	R	R		

G:

A	B	C	D	E	F	G
A	A	R	R	R		

Round 2

A,B	A	B	C	D	E	F	G	Res.
A	A	A	A	A	A	A	A	**A**
B	A	A	A	A	A	A	A	**A**
C	R	R	R	R	R	A	A	**R**
D	R	R	R	R	R	A	A	**R**
E	R	R	R	R	R	A	A	**R**
F	A	A	R	R	R	A	A	**A**
G	A	A	R	R	R	A	A	**A**

-> Attack

C,D,E	A	B	C	D	E	F	G	Res.
A	A	A	A	A	A	R	R	**A**
B	A	A	A	A	A	R	R	**A**
C	R	R	R	R	R	R	R	**R**
D	R	R	R	R	R	R	R	**R**
E	R	R	R	R	R	R	R	**R**
F	A	A	R	R	R	R	R	**R**
G	A	A	R	R	R	R	R	**R**

-> Retreat

Conclusion

- 2 byzantine generals can break the algorithm with 5 honest generals
- Both byz. generals send the same messages to the other generals
  - Byzantine generals don't need to coordinate but need to know the number of byzantine generals

Improved Algorithm:
Round 1
k = 2: 5 honest, 2 byzantine generals, on tie: attack

A: Attack
B: Attack
C: Retreat
D: Retreat
E: Retreat

F:

A	B	C	D	E	F	G
A	A	R	R	R		

G:

A	B	C	D	E	F	G
A	A	R	R	R		

Round 2

A,B	A	B	C	D	E	F	G
A	A	A	A	A	A	A	A
B	A	A	A	A	A	A	A
C	R	R	R	R	R	A	A
D	R	R	R	R	R	A	A
E	R	R	R	R	R	A	A
F	A	A	R	R	R	A	A
G	A	A	R	R	R	A	A

C,D,E	A	B	C	D	E	F	G
A	A	A	A	A	A	R	R
B	A	A	A	A	A	R	R
C	R	R	R	R	R	R	R
D	R	R	R	R	R	R	R
E	R	R	R	R	R	R	R
F	A	A	R	R	R	R	R
G	A	A	R	R	R	R	R

Round 3

- Every general sends all received vectors to all other generals
    - Vectors which are the same at 2k + 1 generals are from honest generals
    - Vectors which are different at > k generals are from byzantine generals
    - Vectors from byzantine generals will be ignored

Round 3

Every general receives:

A,B	A	B	C	D	E	F	G	Res.
A	A	A	A	A	A	A	A	**A**
B	A	A	A	A	A	A	A	**A**
C	R	R	R	R	R	A	A	**R**
D	R	R	R	R	R	A	A	**R**
E	R	R	R	R	R	A	A	**R**
F	A	A	R	R	R	A	A	
G	A	A	R	R	R	A	A	

-> Retreat

F,G	A	B	C	D	E	F	G
A	x	x	x	x	x	x	x
B	x	x	x	x	x	x	x
C	x	x	x	x	x	x	x
D	x	x	x	x	x	x	x
E	x	x	x	x	x	x	x
F	x	x	x	x	x	x	x
G	x	x	x	x	x	x	x

C,D,E	A	B	C	D	E	F	G	Res.
A	A	A	A	A	A	R	R	A
B	A	A	A	A	A	R	R	A
C	R	R	R	R	R	R	R	**R**
D	R	R	R	R	R	R	R	**R**
E	R	R	R	R	R	R	R	**R**
F	A	A	R	R	R	R	R	
G	A	A	R	R	R	R	R	