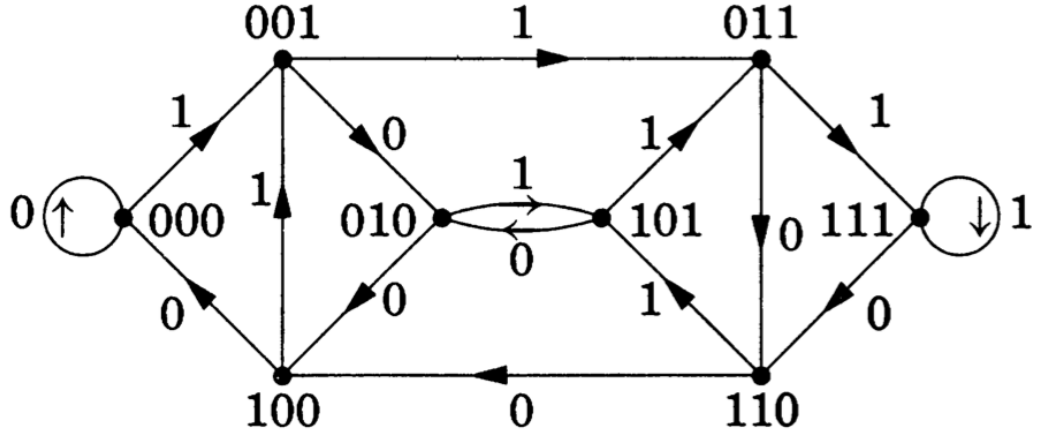
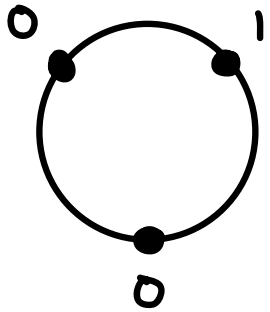
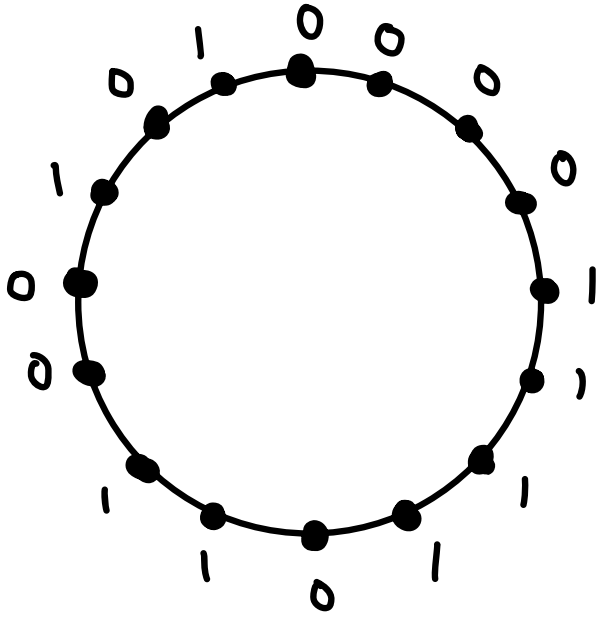
Announcements:

- Quiz today!
- Midterm 1: Wed. 9/20 7:00-8:30pm (Noyes 217)
  - Reference sheet allowed (two-sided)
  - See Monday's email for full policies

Recall: de Bruijn digraph D_n







Last time:

Eulerian circuit in D_n $\longleftrightarrow$ Cyclic arrangement w/ distinct n-strings

Thm 1.4.26: D_n has an Eulerian circuit

Pf:

Def 1.4.27:

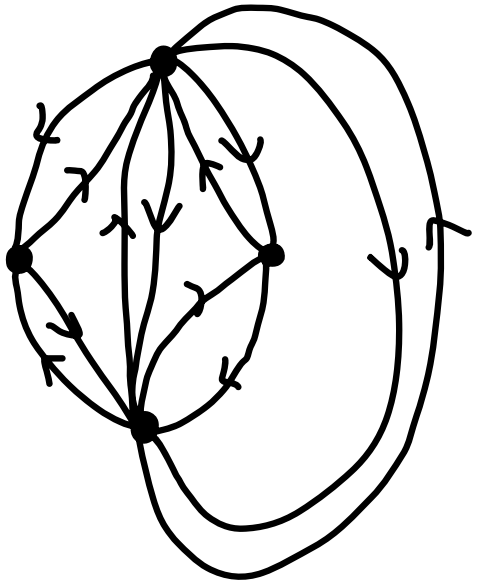
a) A digraph D is an <u>orientation</u> of a graph G if G is the underlying graph of D.

b) An <u>oriented graph</u> is an orientation of a simple graph

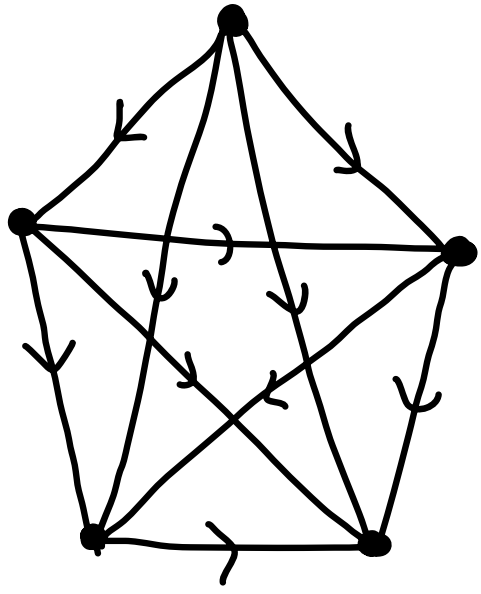
c) A tournament is an orientation of a complete graph

Class activity: Oriented graph? Tournament?

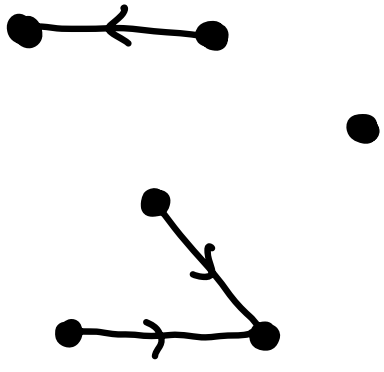
a)



b)



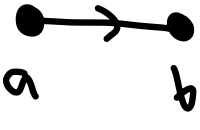
c)

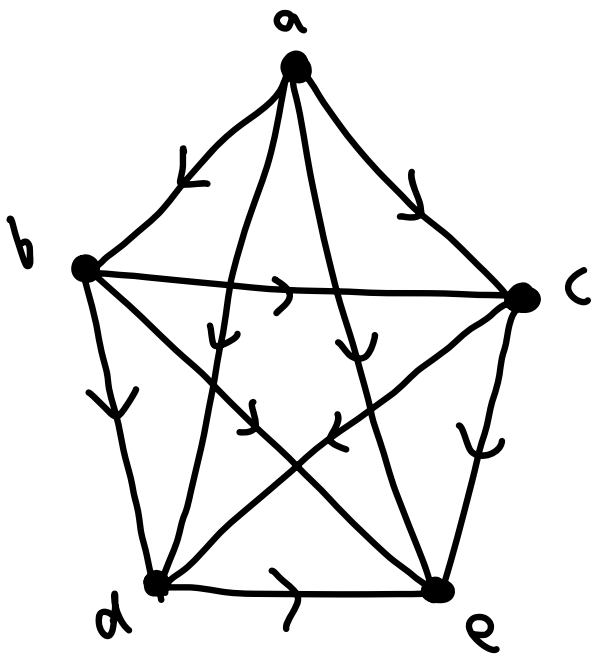


Reason for name "tournament":

Every player plays every other player ("round robin")

If a beats b, orient the edge like this





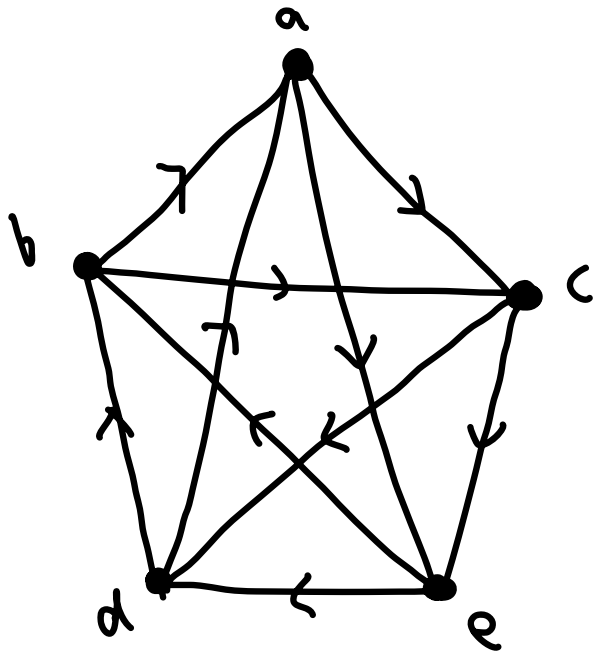
a beats b, c, d, e

b beats c, d, e

c beats d, e

d beats e

a is the champion



a beats c, e

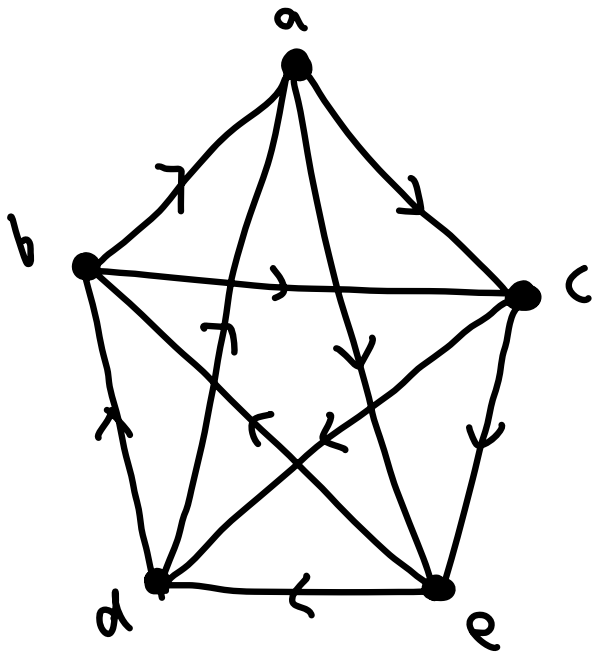
b beats a, c

c beats d, e

d beats a, b

e beats b, d

Def 1.4.29: $v \in V(D)$ is called a <u>king</u> if there is a path of length ≤ 2 from v to every other vertex.



a beats c

a beats e

a beats e beats b

a beats c beats d

So a is a king

Prop 1.4.30: Every tournament T has at least one king

Pf: