CIS 160 Recitation #10

Special Graphs and Variance

There have been 3 recent reminders about collaboration (one on Piazza, one from Rajiv in lecture, and another reminder from Rajiv on Piazza) yet many students have continued to not abide by the collaboration policy.

Anyone found copying another student's work will receive a zero on all assignments 1T up to and including the homework on which copying is found. It only takes one instance of copying for this penalty to be applied.

Multiple students have been assigned this penalty so far, and several have been referred to the Office of Student Conduct. Make sure to review the collaboration policy and reminders on Piazza to make sure you do not end up in this situation.

Hamiltonian Cycles and Eulerian Circuits

- A **Hamiltonian cycle** is a cycle in a graph G is a cycle in which each vertex G of appears exactly once.
- A graph is Hamiltonian if it contains a Hamiltonian cycle.

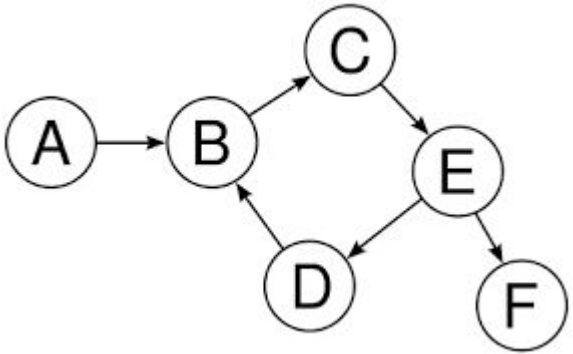
- An **Eulerian circuit** is a closed walk in which every edge appears exactly once.
- A graph is Eulerian if it contains an Eulerian circuit.

Directed Graphs

In a **directed graph**, edges are directed, originating at a vertex and terminating at another. Edges can only be traversed in one direction.

indegree of a vertex: number of edges terminating at that vertex

outdegree of a vertex: number of edges originating at that vertex



Variance

- **Variance** is how much a random variable deviates from its mean.

The variance of a random variable X is:

$$\operatorname{Var}[X] = \mathbf{E}[(X - \mathbf{E}[X])^2] = \mathbf{E}[X^2] - (\mathbf{E}[X])^2$$

Markov's Inequality and Chebyshev's Inequality

Markov's Inequality:

$$\Pr[X \geq a] \leq \frac{\mathbf{E}[X]}{a}$$

Note: X must take on only non-negative values for Markov's Inequality to work.

Chebyshev's Inequality:

$$\Pr[|X - \mathbf{E}[X]| \geq a] \leq \frac{\mathrm{Var}[X]}{a^2}$$