

Assignment 2

Due February 12, 2023, 11:55 PM

1. Given the following graphs:

- The fork graph $F_{n,k}$, the graph containing a path with $n - k$ vertices, where one of the leaves of the path is the center of a star graph with k leaves.
- The complete bipartite graph $K_{m,n}$ on $m + n$ vertices.
- The n -vertex wheel W_n .
- The hypercube Q_n .
- The Spider graph: k paths of lengths $p_1 \geq p_2 \geq \dots \geq p_k$ originated from a single vertex.
- Two dimensional grid and torus (m by n).

a) Give the broadcast time for each of the graphs above. Prove your answers.

b) For each graph indicate the set of the worst originators (vertices for which the broadcast time of the graph is achieved). Describe the broadcast center of each graph.

2. Find the broadcast time of the dipper graph $D_{n,m}$, the graph that has n vertices and $\frac{m(m-1)}{2} + n - m$ edges containing a complete graph K_m and a path of length $n - m$ originated from a vertex of K_m . Indicate the worst originator(s). Also indicate the values of m (as a function of n) that maximizes and minimizes $b(D_{n,m})$ (as a function of n).