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Computer Networks

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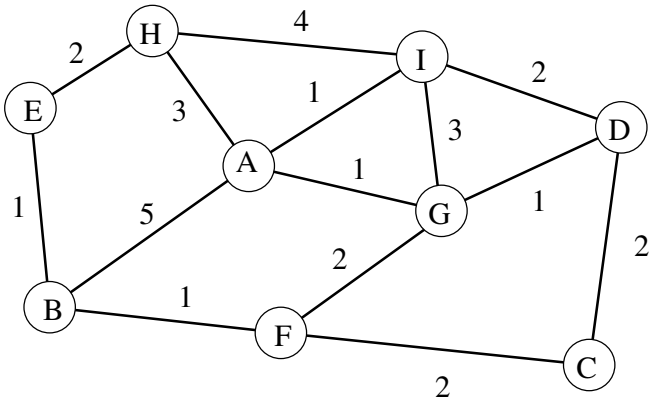
Assignment 8

Problem 24 (4 points)**:**
Consider the two basic approaches identified toward achieving multicast: unicast emulation (i.e. sending one packet for each destination) and network-layer multicast.

(a) Consider a single sender and 32 receivers. Suppose the sender is connected to the receivers through a binary tree of routers. What is the cost of sending a multicast packet, in the case of unicast emulation and network-layer multicast, for this topology? Here, each time a packet (or copy of a packet) is sent over a single link, it incurs a unit of "cost". (2 points)

(b) What topology for interconnecting the sender, receivers, and routers will bring the cost of unicast emulation and true network-layer multicast as far apart as possible? You can choose as many routers as you'd like. (2 points)

Problem 25 (2 points)**:**
Consider the following network:



Suppose node A is chosen as the center in a center-based multicast routing algorithm. Assuming that each router joining the multicast group uses its least-cost path to A to send join messages to A, draw the center-based multicast routing tree resulting from routers B, C, D, and E joining the multicast group initially only consisting of A.

Problem 26 (2 points)**:**
Consider the original reverse path forwarding strategy (without pruning) in the network given in Problem 25. Suppose that A is the multicast source. Using arrows like those shown in Figure 4.53, indicate links for which packets will be forwarded beyond the receiving router, and links for which packets will not be forwarded beyond the receiving router.

Problem 27 (2 points)**:**
Find the Internet draft describing PIM Sparse Mode and list all message types a PIM control message can have and their purpose. (Hint: there are 9 of them, numbered from 0 to 8.)