Midterm: Networking Fall 2022

Select five of the following problems. They are all worth 20 pts.

if you answer more than five, the first five will be selected and every problem afterwards ignored.

The midterm has three pages.

Problem 1:

An RG-58AU coaxial cable has an attenuation of 5.9 dB per 100 **feet**. What is the attenuation at 150 **meters**?

Problem 2:

Two satellites are orbiting at a distance of 1200 km between them. They are communicating using directed laser. The link can sustain data rates of 150Mb/sec. The frames are (up to) 1500 bits long. Acknowledgment frames are 60 bits long. If we use ARQ, where every frame is acknowledged and where a new frame is only sent after the acknowledgment has been received, then what is the proportion of time that the link is used for transmission and not for waiting?

Problem 3:

Use the Hamming code implemented in ecc.py and described in the lecture presentations ONLY. Assume you received the message

[0, 0, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 0, 0, 0].

What is the diagnosis, i.e. does the error control code accept this message as good or does it contain an error. If it contains an error, how would it be corrected.

If you use a different version of the Hamming code, you will get a different answer and not any points on this exercise.

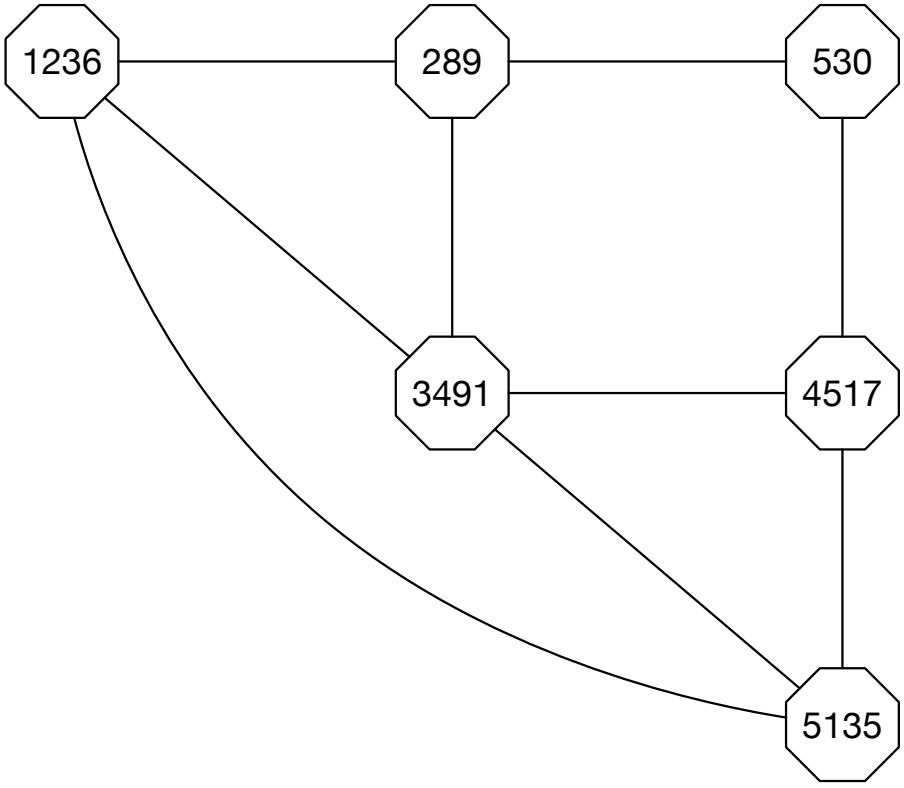
Problem 4:

Assume a switched ethernet with full duplex connections between a station and the switch (as well as between switches). Does the CSMA/CD protocol make any sense?

Problem 5:

The following diagram gives a network of Ethernet bridges (switches) with a large number of redundant connections. Calculate the spanning tree generated by the spanning tree protocol. Recall that the root is the bridge with the lowest ID and that ties are resolved in favor of the

lowest ID. The ID is given by the number inside the hexagon representing a bridge ID. (In reality, the ID are the MAC addresses consisting of six bytes.) Show the results after ***each*** *step.*



Problem 6:

Apply Dijkstra's algorithm to the following graph in order to determine the best routes to / from A. Give the resulting routing tree with A as the root. Show the graph after each incorporation of a new node into the developing tree.