Please print out this form (two-sided, if you can) and write your answers legibly in the spaces provided. If you can’t write legibly, type.

1. Draw a graph with 5 vertices and 8 edges and assign the edges distinct costs from 3 up to 10. Compute a shortest path tree from one of the vertices using Dijkstra’s algorithm and highlight the edges in the tree.

2. In the Bellman-Ford algorithm, suppose that a node \( x \) has a distance vector 
\[
[0 \ 3 \ 2 \ 8 \ 6 \ -15-]
\] where a dash means that there is no known path to that destination yet. The zero entry in the distance vector reflects the zero-length path from \( x \) to itself. Assume that \( x \) has an edge of length 3 to \( y \) and an edge of length 2 to \( z \) and that its current distance vector for \( y \) is 
\[
[3 \ 0 \ 4 \ 5 \ 10 \ -12-]
\] and that its current distance vector for \( z \) is 
\[
[2 \ 4 \ 0 \ 7 \ 4 \ -14-]
\]. Suppose that \( x \) receives a new distance vector 
\[
[3 \ 0 \ 4 \ 5 \ 8 \ 7 \ 11 \ -]
\] from \( y \). Show how this changes the distance vector for \( x \).
3. Consider an AS with 100 routers running OSPF. Assume that the network uses only point-to-point links and that each router has 10 links. If each router experiences a change to the status of one of its incident links every second, what is the maximum number of LSAs that a router can receive in a second? How many of these are not duplicates? How often would you expect a link’s status to change, under “normal” conditions?