Instructions
1. Turn in a physical copy at the beginning of the class on 5/18
2. Ensure the HW cover page has the following information clearly written
   a. Name
   b. UCSD email
   c. PID

Problems
1. Distance-Vector Routing
   For the network shown below, give the global distance-vector tables like those in Tables 3.10 and 3.13 on pages 244 and 246 in the book (P&D) when
   a. Each node knows only the distances to its immediate neighbors.
   b. Each node has reported the information it had in the previous step to its immediate neighbors.
   c. Step “b.” happens a second time.
2. **Link-State Routing**
   Using the same network topology as in the figure in problem 1, draw a table like Table 3.14 on page 258 in the book (P&D) that traces the steps for building the routing table for node C.

3. **AS Routers**
   Suppose P, Q, and R are network service providers with respective CIDR address block allocations 211.0.0.0/8, 212.0.0.0/8, and 213.0.0.0/8. Each provider's customers initially receive address allocations that are a subset of their provider's.

   **P has the following customers:**
   - PA, with allocation 211.163.0.0/16
   - PB, with allocation 211.176.0.0/12.

   **Q has the following customers:**
   - QA, with allocation 212.10.16.0/20
   - QB, with allocation 212.11.0.0/16.

   *Note: For each routing table below you only need two columns; one for the CIDR prefix to match and the other being the next hop network (ex. R, PA, QB, etc.).

   **a.** Give routing tables for P, Q, and R assuming each provider connects to both of the others.

   **b.** Now assume P is connected to Q and Q is connected to R, but P and R are not directly connected. Give tables for P and R.

   **c.** Suppose R is removed. Then customer PA acquires a direct link to Q, and QA acquires a direct link to P, in addition to the other existing links. Give tables for P and Q (should no longer include R).
4. **BGP Routing**

Consider the network shown below, in which horizontal lines represent transit providers and numbered vertical lines are inter-provider links. A, B, and C are networks connected to a particular provider below. The numbered links 2, 3, and 4 just show the links between the providers. For the purposes of this problem, a route can be written as a comma separated path from one provider to another. I.e. the route from B to A through R would be A:<Q,R, P>.

![Network Diagram]

a. Suppose that P, Q, and R are all peer autonomous systems. List the paths that provider P knows to get to network C. If there are none, say so.
b. Similarly, list the paths that provider R has to get to network B. If there are none, say so.
c. Now suppose providers P, Q, and R adopt the policy that outbound traffic is routed to the “closest” inter-provider link that it knows has a path to the destination, thus minimizing their own cost (e.g., P is “closer” to network C than Q as far as R is concerned because link 4 is closer to C than link 3). If P and Q are customers of R, and P and Q are peers, what routes will traffic from network A to network C follow? What about traffic from network C to network B? A to B?
d. Suppose the same as part c above except that now P and R are customers of Q, and P and R are peers. What paths will traffic from network A to network C take? What about from network C to network B? C to A?