# CIS 457 Data Communication: Homework 5

The following are selected from the end of Chapter 5 problem set beginning at page 437 of the textbook. The problem numbers are shown in the parentheses. Total points 30.

1. (4 points) (R5) What is the "count to infinity" problem in distance vector routing?
2. (4 points) (R9) What is meant by an area in an OSPF autonomous system? Why was the concept of an area introduced?
3. (R11) Border Gateway Protocol.
   (a) (4 points) How does BGP update and use the AS-PATH attribute?
   (b) (4 points) How does BGP update and use the NEXT-HOP attribute?
4. (P6) Consider a general topology and a synchronous version of the distance-vector algorithm. Suppose that at each iteration, a node exchanges its distance vectors with its neighbor and receives their distance vectors. Assuming that the algorithm begins with each node knowing only the costs to its immediate neighbors.
   (a) (2 points) what is the maximum number of iterations required before the distributed algorithm converges?
   (b) (3 points) Justify your answer
5. (P7) Consider the network fragment shows on page 440, $x$ has only two attached neighbors ($w$ and $y$), $w$ has a minimum cost path to destination $u$ (not shown) of 5 and $y$ has a minimum cost path to $u$ of 6. The complete paths from $w$ and $y$ to $u$ (and between $w$ and $y$) are not shows. All link costs in the network have strictly positive values.
   (a) (3 points) Give $x$'s distance vector for destinations $w$, $y$, and $u$
   (b) (3 points) Give link-cost change (either increase or decrease) for either $c(x, w)$ or $c(x, y)$ such that $x$ will inform its neighbors of a new minimum cost path to $u$ as a result of executing the distance-vector algorithm.
      - For cost increase, provide the lower-bound $L$ (i.e. when link cost increases above $L$) that causes $x$ to inform its neighbors,
      - For cost decrease, provide the upper-bound $U$ (i.e. when link cost decreases below $U$), ...
   (c) (3 points) For each case of link-cost change above, explain how it affects the shortest path.