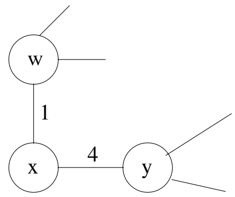
National University of Singapore
School of Computing

CS2105 **Problem Set 6** Semester 2 05/06

1. **(KR, Chapter 4, Problem 25)** Consider the network fragment shown below. 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 shown. All link costs in the network have strictly positive integer values.



   (a) Give x's distance vector for destinations w, y and u.

   (b) Give a link-cost change 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.

   (c) Give a link-cost change for either $c(x, w)$ or $c(x, y)$ such that x will *not* inform its neighbors of a new minimum-cost path to u as a result of executing the distance vector algorithm.

2. **(KR, Chapter 4, Problem 24)** 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 neighbors and receives their distance vectors. Assuming that the algorithm begins with each node knowing only the costs to its immediate neighbors, what is the maximum number of iterations required (from when the algorithm is run the first time) before the distributed algorithm converges? Justify your answer.

3. **(KR, Chapter 5, Problem 2)** Show (give an example) that two-dimensional parity checks can detect, but not correct a double-bit error.

4. **(KR, Chapter 5, Problem 4)** Consider a 4-bit generator G with value 1001 and the data D has the value of 10101010. What is the CRC checksum R?