Fall 2006 **CMSC 451: ADD TO MIDTERM** William Gasarch

Nov 6

Guideline: If you got under 60 on the exam then you can do both of these problems and add to your score. If you got under 75 on the exam then you can do ONE of these problems (your choice) and add to your score. No matter who you are you are urged to DO these problems as practice. They are due Nov 6.

1. (0 points). Write your name clearly.

2. (5 points) Dijkstras algorithm used the definition of the cost of a path as being the SUM of the edge weights. We define the cost of a path as being the SUM of the MOST and LEAST expensive weights on a path. For example, if a path of length 4 has edge weights 3,8,9,2 then the cost of that path is $9 + 2 = 11$. A 1-edge path has cost double its weight. Write psuedo code for an algorithm for Single Source Shortest Path with this definition of distance.

3. (5 points) Let $\omega = e^{2\pi i/20}$. Let

   $$p(x) = 10x^{12} + 5x^{11} + 8x^{10} + 19x^9 + 20x^8 + 5x^7 + 12x^5 + 8x^4 + 11x^3 + 10x^2 + 31.$$

   I want to evaluate p on $\omega, \omega^2, \omega^3, \ldots, \omega^{20}$. Note that p is of degree 12. Fill in the following sentence:

   "In order to evaluate p on $\omega, \omega^2, \omega^3, \ldots, \omega^{20}$ it will suffice to evaluate XXX, YYY, ZZZ, WWW polynomials of degree ≤ 3, on the numbers in set NNN, a set with LESS THAN 5 numbers."

   (XXX, YYY, ZZZ, WWW should be polynomials. NNN should be a set of LESS THAN 5 numbers.)