Test 3 Review CSCI 432

End of Semester Logistics

- 1. Take Test 3 on Thursday 5/1.
- 2. Test 3 grades up on 5/1.
- 3. Final letter grade, assuming you skip final, up on 5/1-5/3
- 4. Final exam 12:00 1:50 on 5/8.

Final Exam:

- Cumulative.
- No risk to try (I drop your lowest of four test grades).
- If your final letter grade is listed as an 'A', do not come to the final.

- 1. During class on Thursday 5/1.
- 2. You can bring your book and any notes you would like, but no electronic devices.
- 3. You may assume anything proven in class or on homework.
- 4. Five questions (15 points):
- Same1)Running time (2 points).Same2)Running time (2 points).Problem3)Approximation ratio (5 points).4)"Tight" example (3 points).

 - 5) Vertex Cover LP question (3 points).

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Provide a problem instance that demonstrates that the approximation ratio found is tight. Don't worry about generalizing an instance or anything, just provide a single graph where the algorithm *can* result in a solution that is equal to $\frac{1}{2}$ of the optimal value.

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Vertex Cover ILP

 $x_i \in [0,1]$ = Indicates if vertex *i* is selected. Objective: min $\sum_i x_i$ Subject to: $x_i + x_j \ge 1$, for each edge e = (i,j)

$$\begin{array}{l} & \quad \text{If } x_i \geq \frac{1}{2}, \text{ add vertex } i \\ & \quad \text{to our subset } S. \end{array}
 \end{array}$$

Is *S* a vertex cover?

Yes. For every edge, $x_i + x_j \ge 1$. Thus, at least one of x_i or $x_j \ge \frac{1}{2}$. So for every edge, at least one of its vertices will be in S.

Review lecture from April 10th

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