MAT 145 - Problem Set
# June 1

Collaboration is permitted; looking for solutions from external sources (books, the web, etc.) is prohibited.

1. (a) Find the Prüfer code of the following labeled graph: A star on 6 nodes where the central node is labeled 5 and the others are labeled with labels in $\{0, 1, 2, 3, 4\}$.

   (b) Find the labeled graph (with labels $\{0, 1, 2, 3, 4, 5, 6\}$) associated to the Prüfer code 01020.

2. Let the "Tree Shortcut Algorithm" be the factor-2 approximation algorithm (using MST) for TSP instances satisfying triangle inequality. Show by an example that if we don't assume the triangle inequality, then the tour found by the Tree Shortcut Algorithm can be longer than 1000 times the optimum tour.

3. Does the graph in the following figure have a perfect matching?
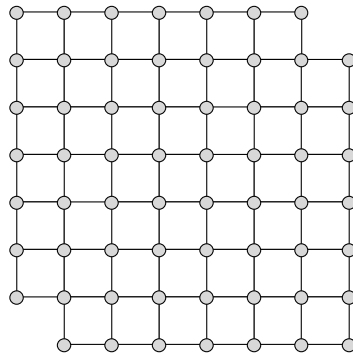
4. How many perfect matchings does the following "ladder graph" with $2n$ nodes have?