Problem 1. Run the stable marriage algorithm on the following instance to create a stable marriage. Show all your steps.

Instance: There are 4 men, $m_1, m_2, m_3, m_4$ and 4 women, $w_1, w_2, w_3, w_4$. Following are the preference lists for the 4 men:

- $m_1 : [w_1, w_2, w_4, w_3]$
- $m_2 : [w_1, w_4, w_2, w_3]$
- $m_3 : [w_1, w_2, w_3, w_4]$
- $m_4 : [w_4, w_3, w_1, w_2]$

Preference list for the women are as follow:

- $w_1 : [m_2, m_3, m_1, m_4]$
- $w_2 : [m_3, m_1, m_2, m_4]$
- $w_3 : [m_4, m_2, m_1, m_3]$
- $w_4 : [m_2, m_4, m_1, m_3]$

Problem 2. Give an instance of the stable marriage problem where there are multiple stable marriages. Show at least two different stable marriages and show how you computed them. (A hint will be posted on piazza.)

Problem 3. The ASCII representation is used to represent each character of the alphabet. You can look these up at http://www.asciitable.com/ if you like. For example “A” is 65, “B” is 66, etc.

Now take your own first name (if its too long you can use just the first 8 letters) and compute the sum of the numbers and then take $\mod 199$. This is the “hash” of the name.

For example, take the name “TOM”. The ASCII of the characters are “T” is 84. “O” is 79, “M” is 77. The sum of the ASCII representations is 240. $240 \mod 199$ is 41. This is the hash value.

(The $\mod$ operation is the modulo operation which finds the remainder after the division of a number by another. For example, $5 \mod 2 = 1$, since on dividing 5 by 2, the remainder is 1.)

Problem 4. Research the name “Atanasoff” and discuss his contributions to Computing.

Problem 5. Write a short description on the Jacquard Loom. Why do you think this is an interesting thing?