1. Is the following graph planar? If so, redraw it so that it has no crossing edges. If not, give a reason why.

2. There are 3 men and 3 women. The graph below indicates the couples that are currently married.

Each person also (secretly) ranks the members of the opposite sex according to their preference.
$m_1 : w_1 > w_2 > w_3$, $m_2 : w_1 > w_3 > w_2$, $m_3 : w_2 > w_1 > w_3$,

$w_1 : m_1 > m_2 > m_3$, $w_2 : m_3 > m_2 > m_1$, $w_3 : m_1 > m_3 > m_2$.

The current matching of couples is NOT STABLE. Give a reason why this is not a stable matching.

3. Besides the marriage problem and student-residency matching, give another application the Gale-Shapley algorithm for stable matchings can be used for.