HW7: Stable Matching

Q1: Consider the following preferences

favorite ↓ least favorite ↓

	1st	2nd	3rd
Xavier	Amy	Bertha	Clare
Yancey	Bertha	Amy	Clare
Zeus	Amy	Bertha	Clare

Men's Preference Profile

favorite ↓ least favorite ↓

	1st	2nd	3rd
Amy	Yancey	Xavier	Zeus
Bertha	Xavier	Yancey	Zeus
Clare	Xavier	Yancey	Zeus

Women's Preference Profile

If you choose to index the men (x,y,z) as (0,1,2), and the women (a,b,c) as (0,1,2), and begin with an initial linked list of x->y->z, write down how the arrays M, W, and WR are constructed, and how the linked list and arrays RK and WP change over time.

Linked list: a list of free men
M: Men's preference list
W: Women's preference list
WR: Women's ranking array, where WR[i][j] stores the ranking of men j in woman i's preference list
RK: Men's next proposal array, where RK[i] stores the next woman the man i is going to propose in the next round.
WP: Women's partner array, where WP[i] stores the current partner of woman i, WP[i]=-1 is woman i is unpaired.

A1:

Initial setup:
X = 0; Y = 1; Z = 2;
A = 0; B = 1; C = 2;
M=[[1,2,3]
[2,1,3]
[1,2,3]]
W=[[2,1,3]
[1,2,3]
[1,2,3]]
WR=[[2,1,3]
[1,2,3]
[1,2,3]]
Linked list: X->Y->Z;
RK[0]=0, RK[1]=0, RK[2]=0;
WP[0]=-1, WP[1]=-1, WP[2]=-1;

X proposes to A:
Linked list: Y->Z;
RK[0]=1, RK[1]=0, RK[2]=0;
WP[0]=0, WP[1]=-1, WP[2]=-1;

Y proposes to B:
Linked list: Z;
RK[0]=1, RK[1]=1, RK[2]=0;
WP[0]=0, WP[1]=1, WP[2]=-1;

- *Y proposes to A:*
  Linked list: Z;
  RK[0]=1, RK[1]=1, RK[2]=1;
  WP[0]=0, WP[1]=1, WP[2]=-1;
  (Check WR[0][0] = 2, WR[0][2] = 3; WR[0][0] < WR[0][2], A rejects Z)

- *Y proposes to B:*
  Linked list: Z;
  RK[0]=1, RK[1]=1, RK[2]=2;
  WP[0]=0, WP[1]=1, WP[2]=-1;
  (Check WR[1][1] = 2, WR[1][2] = 3; WR[1][1] < WR[1][2], B rejects Z)

- *Y proposes to C:*
  Linked list: N/A;
  RK[0]=1, RK[1]=1, RK[2]=3;
  WP[0]=0, WP[1]=1, WP[2]=2;