Second Assignment

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Exercise 1

```
id=1:10;
age=[18 17 22 23 17 25 16 17 22 26]';
gender=[1 0 0 1 0 1 0 1 1 1]';
id_age_gender=[id',age,gender]
```

```
id_age_gender = 10×3
     1    18     1
     2    17     0
     3    22     0
     4    23     1
     5    17     0
     6    25     1
     7    16     0
     8    17     1
     9    22     1
    10    26     1
```

1.1 Find the number of People in sample

```
age_17_w=id_age_gender((id_age_gender(:,2)==17)&(id_age_gender(:,3)==0),:)
```

```
age_17_w = 2×3
     2    17     0
     5    17     0
```

There are two scenarios. First, if all people are different, aka, we only classify people by their id, then there will be 10 people. However, if the id infomation is not accurate, we need to do some basic data extraction to find how many people are the same one by the criterion of age and gender. Through the above bunk of code, at the age of 17, there are two persons with same age and gender, therefore, they can possiblly be the same person. If this happens, there are 9 people.

1.2 Find the number of variables in sample

There are three variables. ID, Age, and Gender, respectively.

1.3 Find the number of total observations

10.

1.4 Find ID number of legal people (age>=21)

```
legal_peo=id_age_gender(id_age_gender(:,2)>=21,:)
```

```
legal_peo = 5×3
     3    22     0
     4    23     1
     6    25     1
     9    22     1
    10    26     1
```

1.5 Find the number of women in the sample

```
women=id_age_gender(id_age_gender(:,3)==1,:)
```

```
women = 6×3
     1    18     1
     4    23     1
     6    25     1
     8    17     1
     9    22     1
    10    26     1
```

Therefore, there are 6 women in the sample.

1.6 Find the sample of men in the sample

10-6=4. Because they are complement set. Therefore, there are 4 people of men in the sample set.

1.7 Find the number of women >=21

```
women_over_21=id_age_gender(id_age_gender(:,2)>=21 & id_age_gender(:,3)==1,:)
```

```
women_over_21 = 4×3
     4    23     1
     6    25     1
     9    22     1
    10    26     1
```

4 women whose age is larger of equal to 21.

1.8 Find the number of men<21

```
men_less_21=id_age_gender(id_age_gender(:,2)<21 & id_age_gender(:,3)==0,:)
```

```
men_less_21 = 3×3
     2    17     0
     5    17     0
     7    16     0
```

Three men satisfies this criterion.

1.9 Find the ID number of men >=21

```
id_men_over_eq_21=id_age_gender(id_age_gender(:,2)>=21 &id_age_gender(:,3)==0,1)
```

```
id_men_over_eq_21 = 3
```

Only one man satisfies this, and his id number is 3.

1.10 Find the ID number of oldest person

```
id_oldest=id_age_gender(id_age_gender(:,2)==max(id_age_gender(:,2)),1)
```

```
id_oldest = 10
```

The oldest guy's id number is 10

1.11 Find the complete rows of womens <21

```
wom_less_21=id_age_gender(id_age_gender(:,2)<21 & id_age_gender(:,3)==1,:)
```

```
wom_less_21 = 2×3
     1    18     1
     8    17     1
```

1.12 Find Ratio of women >21 with respect to men >21

From 1.9 we know, the number of men>21 is 1, and from 1.7, the number of women>21 is 4.

Therefore, ratio=4

1.13 Find ID number and gender of youngest person in sample

```
youngest_id_gender=id_age_gender(id_age_gender(:,2)==min(id_age_gender(:,2)),[1,3])
```

```
youngest_id_gender = 1×2
     7     0
```

1.14 Create a matrix of male younger than 20

```
Male_less_20=id_age_gender(id_age_gender(:,2)<20 &id_age_gender(:,3)==0,:)
```

```
Male_less_20 = 3×3
     2    17     0
     5    17     0
     7    16     0
```

1.15 Create a matrix of female older than 20

```
female_older_20=id_age_gender(id_age_gender(:,2)>20 & id_age_gender(:,3)==1,:)
```

```
female_older_20 = 4×3
     4    23     1
     6    25     1
     9    22     1
    10    26     1
```

Exercise 2

2.1 Determine the bond price

```
yield=0.04;
couponRate=0.05;
settle=datenum('17-Jun-2018');
maturity=datenum('18-Dec-2020');
bndprice(yield,couponRate,settle,maturity)
```

```
ans = 102.3591
```

2.2 Determine the payment dates using the cfdates function.

```
CFlowdays=cfdates(settle,maturity,4,10,1);
datestr(CFlowdays)
```

```
ans = 11×11 char array
    '18-Jun-2018'
    '18-Sep-2018'
    '18-Dec-2018'
    '18-Mar-2019'
    '18-Jun-2019'
```

```
'18-Sep-2019'
'18-Dec-2019'
'18-Mar-2020'
'18-Jun-2020'
'18-Sep-2020'
'18-Dec-2020'
```

Reference: https://www.mathworks.com/help/finance/cfdates.html One thing needs to be mentioned, for the actual/365, there are 3 basis:

- 7 = actual/365 (Japanese)
- 10 = actual/365 (ICMA)
- 12 = actual/365 (ISDA)

I use ICMA instead.

2.3 Compute the bond prices.

```
bond_5_yields=bndprice(0.05,couponRate,settle,maturity)
```

```
bond_5_yields = 99.9998
```

```
bond_6_yields=bndprice(0.06,couponRate,settle,maturity)
```

```
bond_6_yields = 97.7076
```

When yield rate increases, the bond price will decrease. Negative relation.

Exercise 3

```
g='Is Stable coin a ponzi scheme?';
g1=g+66;
g2=setstr(g1)
```

```
g2 =
'µb¶£¤®§b¥±«°b£b²±°¼«bµ¥ª§¯§'
```

```
%Check whether it can be deciphered
g3=g2-66;
setstr(g3)
```

```
ans =
'Is Stable coin a ponzi scheme?'
```