Project 8 by
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Question 1

(a) The MBS price for the parameters k = 0.6 and r_bar = 0.08, using the Numerix Prepayment Model = **$100783.101689 (see output screenshot)**

(b) The MBS price for K = 0.3,0.4, ... ,0.9 are summarized in ScreenShot 1.

Graph

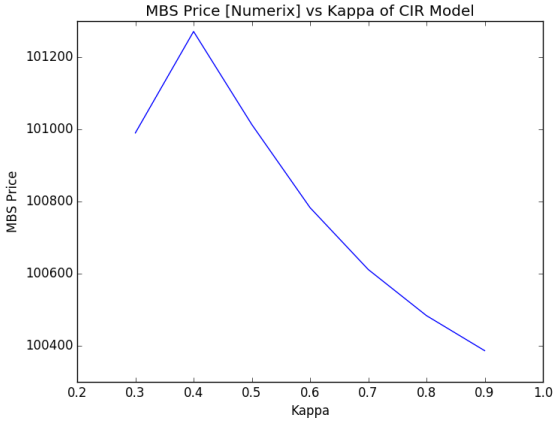


Fig1b

(c) The MBS price for r_bar= 0.03,0.04, ... ,0.09 are summarized in ScreenShot 1.

Graph

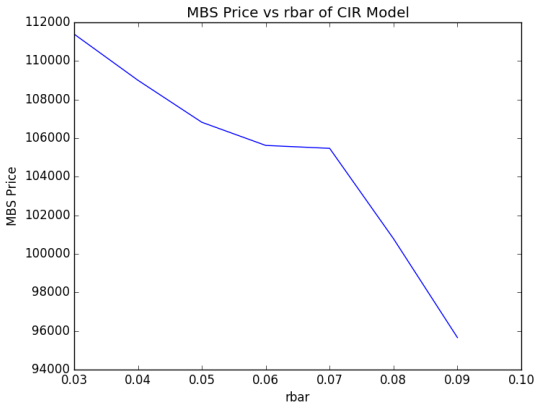


Fig1c

Output

```
/Users/akumar/anaconda/bin/python /Users/akumar/Python/com/ashwin/computationalmethodsinfinance/Project9/Q1.py
a) MBS = 100783.101689      ****[4.554956 sec]
  k    MBSPrice-Numerix
 ---  ------------------
0.3              100990
0.4              101271
0.5              101013
0.6              100783
0.7              100612
0.8              100484
0.9              100387
   r    MBSPrice-Numerix
 ----  ------------------
0.03             111393
0.04             108997
0.05             106821
0.06             105621
0.07             105471
0.08             100783
0.09              95661.4

Process finished with exit code 0
```

screenshot 1

Question 2

(a) The MBS price for the parameters K = 0.6 and r_bar = 0.08, using the PSA Prepayment Model = **$100867.739605. (see output screenshot)**

(b) The MBS price for K = 0.3,0.4, ... ,0.9 are summarized in ScreenShot 2.

Graph

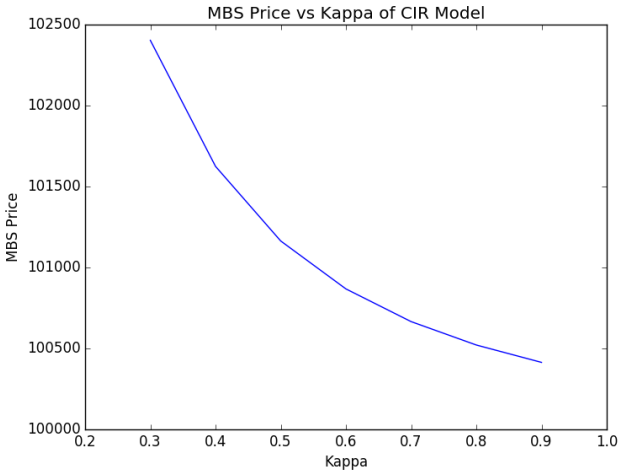


Fig2b

Output

```
/Users/akumar/anaconda/bin/python /Users/akumar/Python/com/ashwin/computationalmethodsinfinance/Project9/Q2.py
a) MBS = 100867.739605      ****[4.820516 sec]
  k    MBSPrice-Numerix
---  ------------------
0.3              102403
0.4              101624
0.5              101164
0.6              100868
0.7              100666
0.8              100521
0.9              100414

Process finished with exit code 0
```

screenshot 2

****

Question 3

The Option Adjusted Spread x for the Numerix Prepayment Model for a Market Value = $110,000 = -1.2548%
The market value is higher than the model value(from Q1). Hence we have negative OAS .

Output

```
/Users/akumar/anaconda/bin/python /Users/akumar/Python/com/ashwin/computationalmethodsinfinance/Project9/Q3.py
a) OAS = -0.012548      ****[19.971611 sec]

Process finished with exit code 0
```

screenshot 3

****

Question 4

OAS-adjusted Duration and Convexity for y = 5bps

OAS – adjusted duration = $\frac{P_{(-)} - P_{(+)}}{2yP_0}$ **= 7.211608 (refer output screenshot)**

OAS – adjusted duration = $\frac{P_{(-)} + P_{(+)}\, 2P_0}{2y^2 P_0}$ = **45.758551(refer output screenshot)**

Output

```
/Users/akumar/anaconda/bin/python /Users/akumar/Python/com/ashwin/computationalmethodsinfinance/Project9/Q4.py
a) Duration = 7.211608 Convexity = 45.758551     ****[26.750697 sec]

Process finished with exit code 0
```

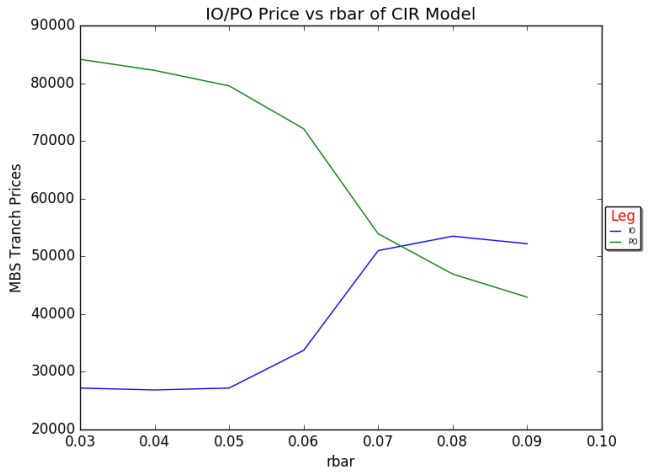
screenshot 4

****

Question 5

The tranches for r_bar = 0.03,0.04, ... ,0.09 are summarized in screenshot 5.

Graph



Output

```
/Users/akumar/anaconda/bin/python /Users/akumar/Python/com/ashwin/computationalmethodsinfinance/Project9/Q5.py
Table for IO and PO Prices ****[46.608576 sec]
    r       IO       PO
-----  -------  -------
0.03   27186.1  84140.1
0.04   26853.9  82219.1
0.05   27188.6  79544.5
0.06   33719.7  72114.3
0.07   51000.9  53911.3
0.08   53491.3  46936.9
0.09   52192.1  42928.7

Process finished with exit code 0
```

screenshot 5