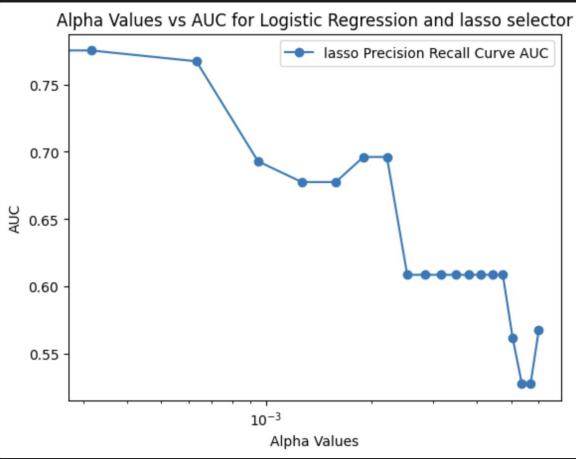
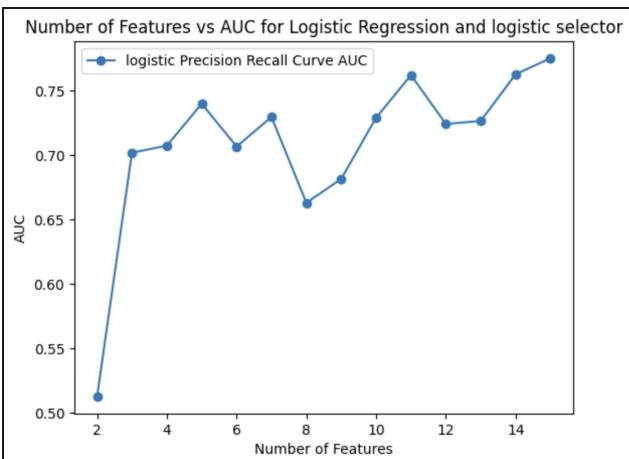
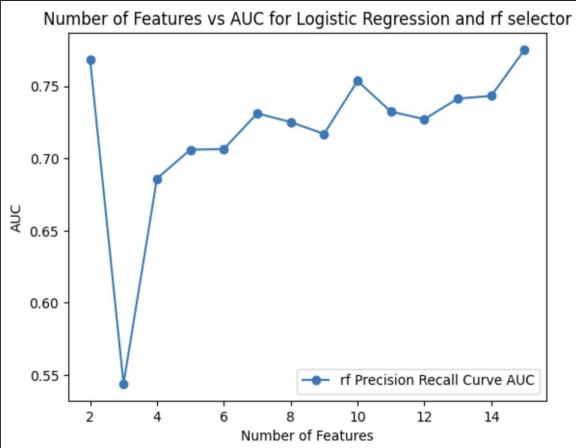
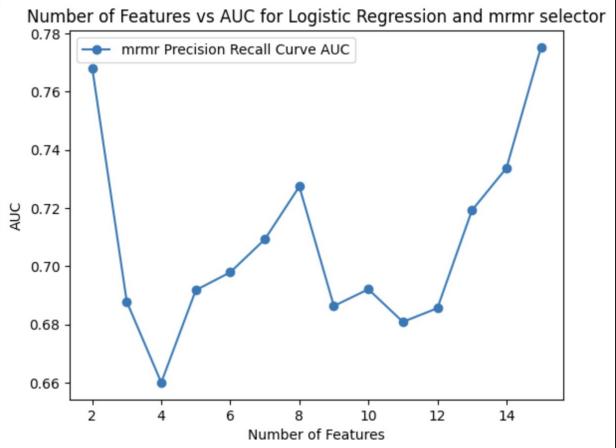


# Risultati classificatori

# 16 features

Correlation (0.85%) 16 → 15 features

# LOG

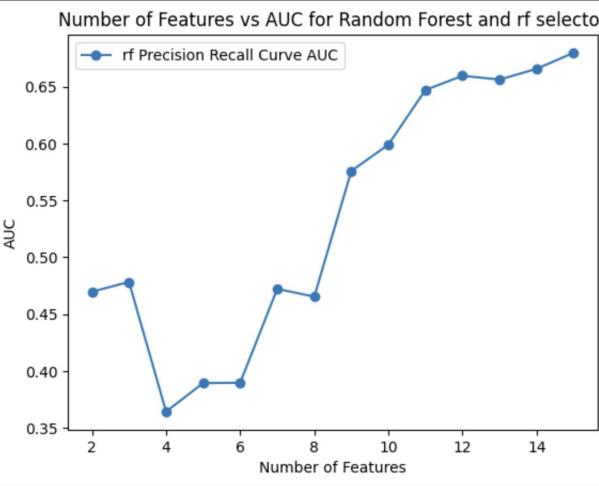
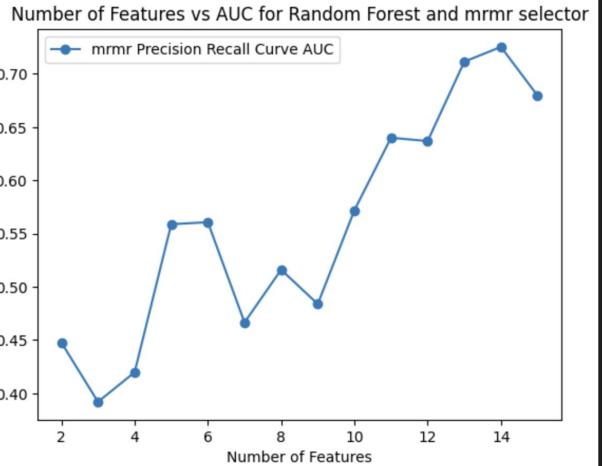


Per mrmr  
num\_features: 10  
pr\_auc: 0.6920906930265219  
best\_precision: 1.0  
best\_recall: 0.09090909090909091  
roc\_auc: 0.7012987012987013  
f1: 0.16666666666666669  
accuracy: 0.6  
confusion\_matrix: [14 0]  
[10 1]

Per rf  
num\_features: 14  
pr\_auc: 0.7432811692169982  
best\_precision: 1.0  
best\_recall: 0.09090909090909091  
roc\_auc: 0.7467532467532467  
f1: 0.16666666666666669  
accuracy: 0.6  
confusion\_matrix: [14 0]  
[10 1]

Per logistic  
num\_features: 8  
pr\_auc: 0.6631617936430771  
best\_precision: 1.0  
best\_recall: 0.09090909090909091  
roc\_auc: 0.7142857142857143  
f1: 0.16666666666666669  
accuracy: 0.6  
confusion\_matrix: [14 0]  
[10 1]

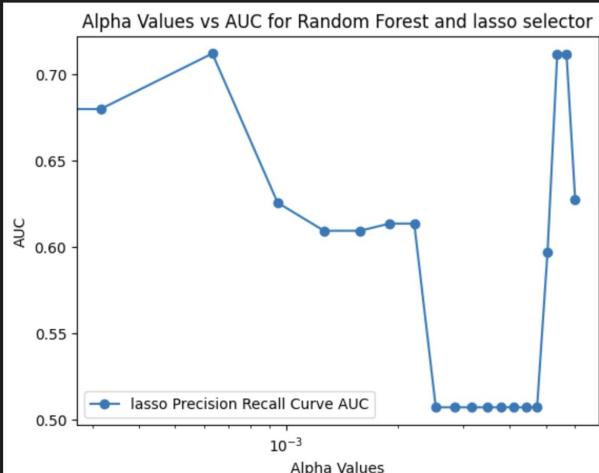
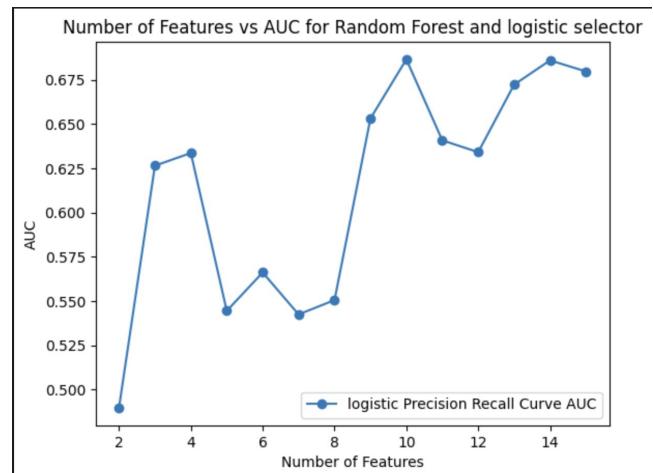
Per lasso  
alpha: 0.0  
pr\_auc: 0.7752935196117015  
best\_precision: 1.0  
best\_recall: 0.09090909090909091  
roc\_auc: 0.7662337662337663  
f1: 0.16666666666666669  
accuracy: 0.6  
confusion\_matrix: [14 0]  
[10 1]



RF

Per mrmr

**num\_features:** 6  
**pr\_auc:** 0.5607372425554243  
**best\_precision:** 0.75  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.6168831168831169  
**f1:** 0.39999999999999997  
**accuracy:** 0.64  
**confusion\_matrix:** [13 1]  
[ 8 3]



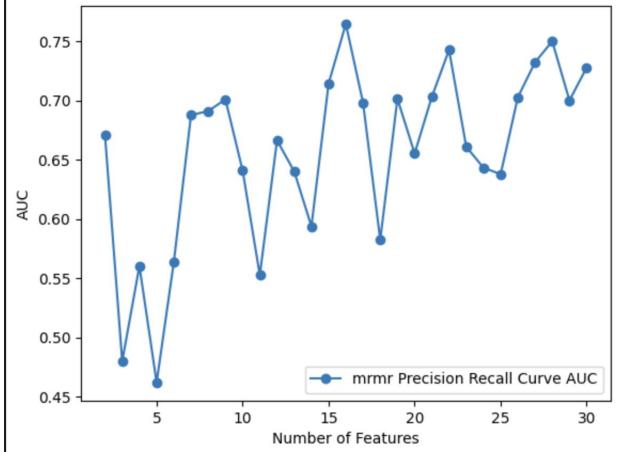
Per logistic

**num\_features:** 10  
**pr\_auc:** 0.686470829797963  
**best\_precision:** 0.75  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.6753246753246753  
**f1:** 0.39999999999999997  
**accuracy:** 0.64  
**confusion\_matrix:** [13 1]  
[ 8 3]

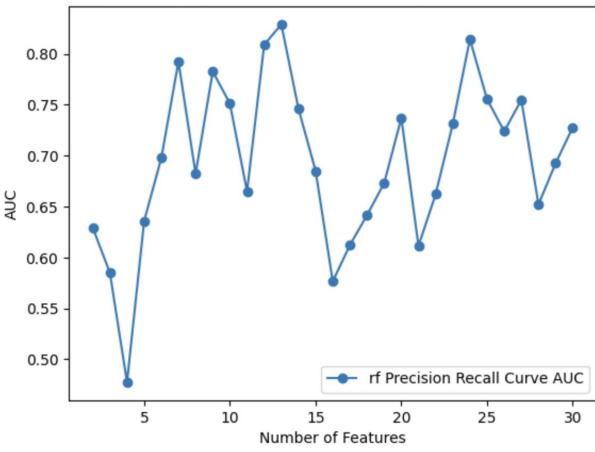
Per lasso

**alpha:** 0.0  
**pr\_auc:** 0.6796415260319003  
**best\_precision:** 0.75  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.6493506493506493  
**f1:** 0.39999999999999997  
**accuracy:** 0.64  
**confusion\_matrix:** [13 1]  
[ 8 3]

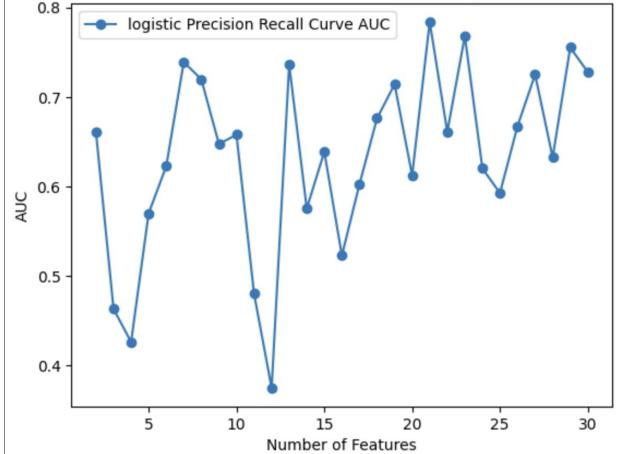
Number of Features vs AUC for MLP and mrmr selector



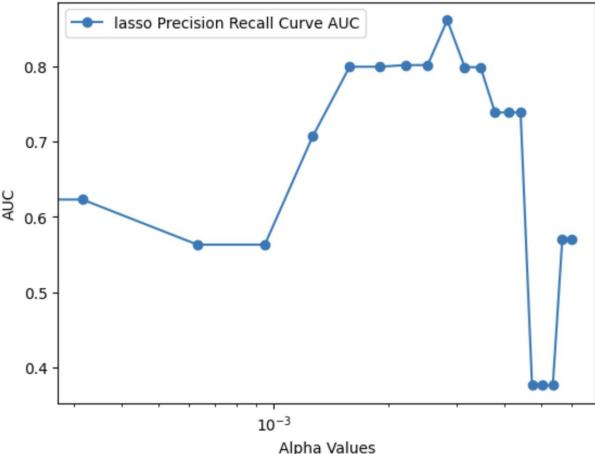
Number of Features vs AUC for MLP and rf selector



Number of Features vs AUC for MLP and logistic selector



Alpha Values vs AUC for MLP and lasso selector



# MLP

(128,64,32)

Per mrmr

**num\_features:** 14  
**pr\_auc:** 0.698273544637181  
**best\_precision:** 0.7142857142857143  
**best\_recall:** 0.4545454545454545  
**roc\_auc:** 0.7792207792207793  
**f1:** 0.5555555555555556  
**accuracy:** 0.68  
**confusion\_matrix:** [12 2]  
[ 6 5]

Per rf

**num\_features:** 15  
**pr\_auc:** 0.769323101141283  
**best\_precision:** 0.625  
**best\_recall:** 0.4545454545454545  
**roc\_auc:** 0.7597402597402596  
**f1:** 0.5263157894736842  
**accuracy:** 0.64  
**confusion\_matrix:** [11 3]  
[ 6 5]

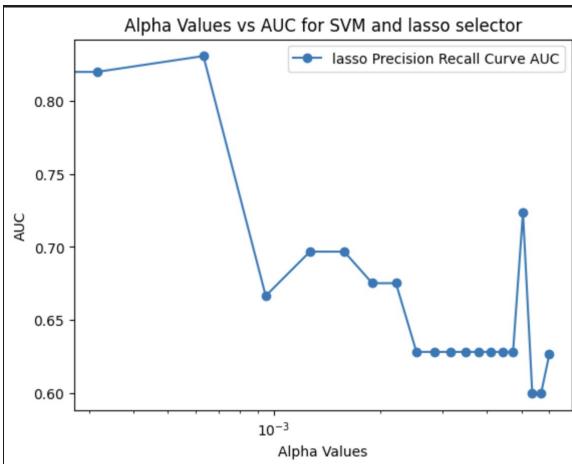
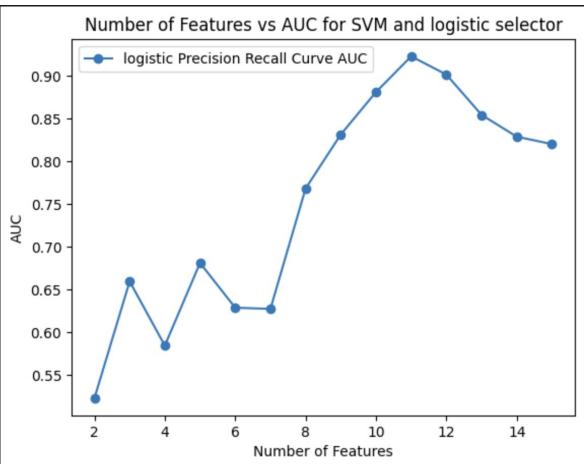
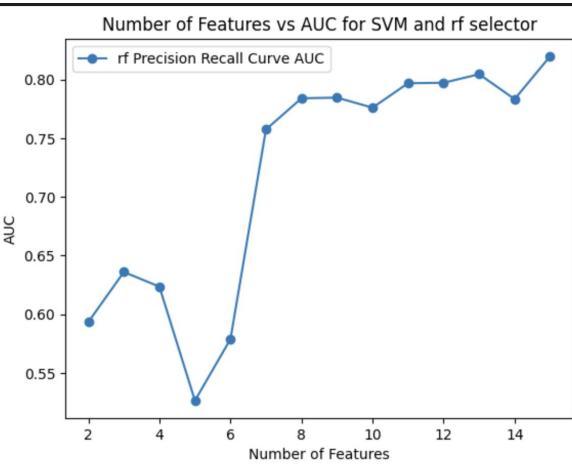
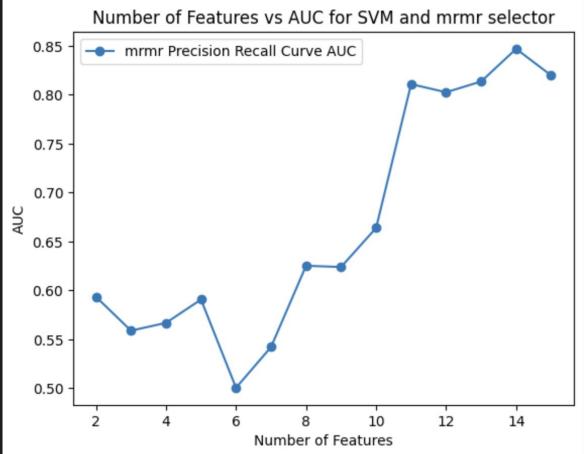
Per logistic

**num\_features:** 10  
**pr\_auc:** 0.8726340326340326  
**best\_precision:** 1.0  
**best\_recall:** 0.6363636363636364  
**roc\_auc:** 0.8376623376623377  
**f1:** 0.7777777777777778  
**accuracy:** 0.84  
**confusion\_matrix:** [14 0]  
[ 4 7]

Per lasso

**alpha:** 0.0  
**pr\_auc:** 0.769323101141283  
**best\_precision:** 0.625  
**best\_recall:** 0.4545454545454545  
**roc\_auc:** 0.7597402597402596  
**f1:** 0.5263157894736842  
**accuracy:** 0.64  
**confusion\_matrix:** [11 3]  
[ 6 5]

# SVM



Per mrmr  
**num\_features:** 14  
 pr\_auc: 0.8468975468975469  
 best\_precision: 1.0  
 best\_recall: 0.4545454545454545  
 roc\_auc: 0.8506493506493507  
 f1: 0.625  
 accuracy: 0.76  
 confusion\_matrix: [14 0]  
                   [ 6 5]

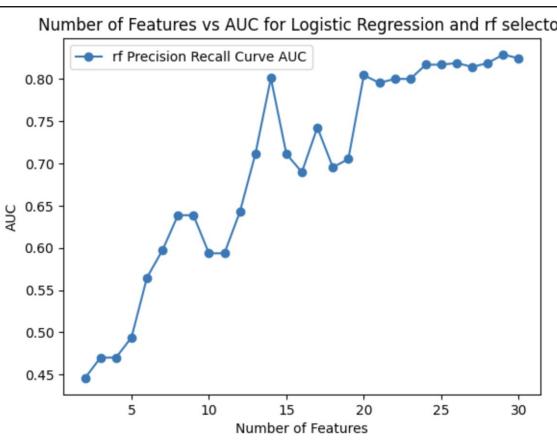
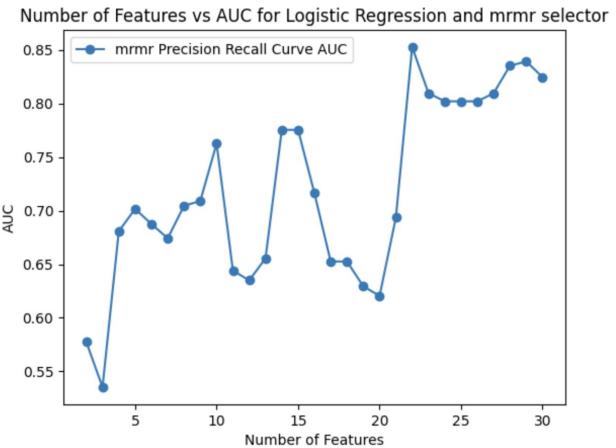
Per rf  
**num\_features:** 12  
 pr\_auc: 0.7971349283515059  
 best\_precision: 1.0  
 best\_recall: 0.4545454545454545  
 roc\_auc: 0.7857142857142857  
 f1: 0.625  
 accuracy: 0.76  
 confusion\_matrix: [14 0]  
                   [ 6 5]

Per logistic  
**num\_features:** 9  
 pr\_auc: 0.8310883560883561  
 best\_precision: 1.0  
 best\_recall: 0.4545454545454545  
 roc\_auc: 0.8116883116883117  
 f1: 0.625  
 accuracy: 0.76  
 confusion\_matrix: [14 0]  
                   [ 6 5]

Per lasso  
**alpha:** 0.0  
 pr\_auc: 0.8197625606716517  
 best\_precision: 0.8333333333333334  
 best\_recall: 0.4545454545454545  
 roc\_auc: 0.8441558441558442  
 f1: 0.5882352941176471  
 accuracy: 0.72  
 confusion\_matrix: [13 1]  
                   [ 6 5]

# 32 features

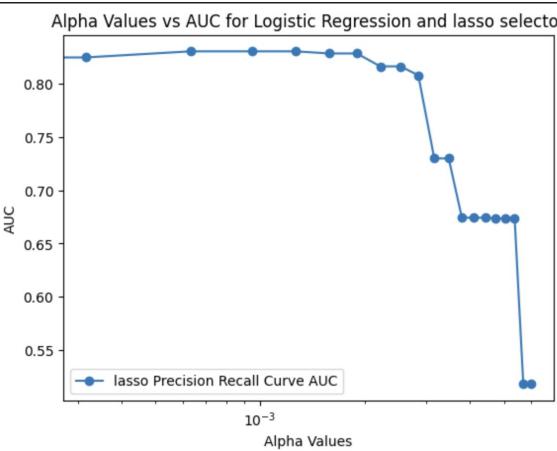
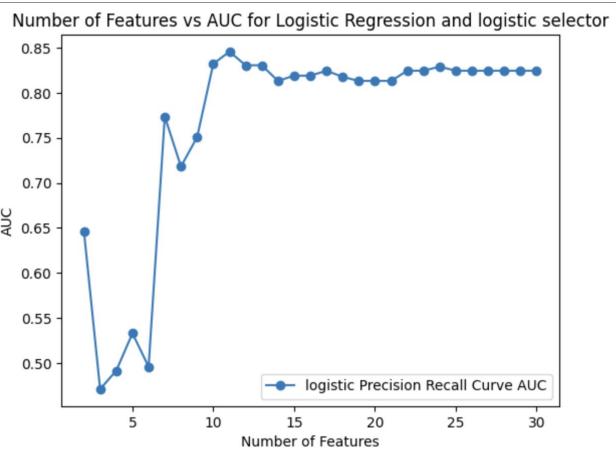
Correlation (0.85%) 32 → 30 features



# LOG (male)

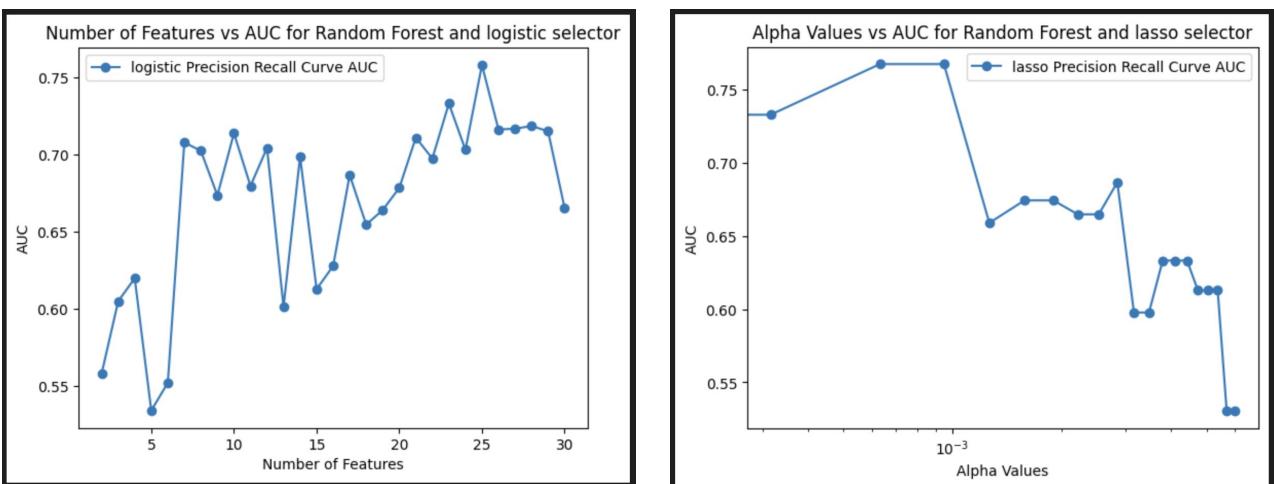
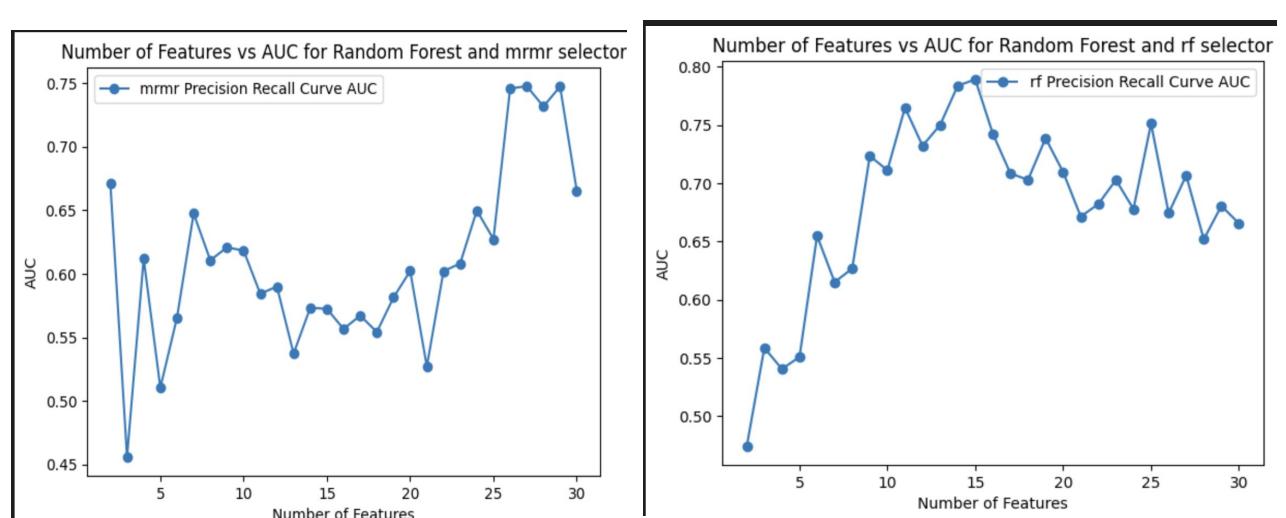
Per mrmr  
**num\_features:** 2  
**pr\_auc:** 0.5776573990477734  
**best\_precision:** 0.0  
**best\_recall:** 0.0  
**roc\_auc:** 0.6233766233766234  
**f1:** 0.0  
**accuracy:** 0.56  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 11 & 0 \end{bmatrix}$

Per rf  
**num\_features:** 13  
**pr\_auc:** 0.7114143432325251  
**best\_precision:** 1.0  
**best\_recall:** 0.18181818181818182  
**roc\_auc:** 0.7142857142857143  
**f1:** 0.3076923076923077  
**accuracy:** 0.64  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 9 & 2 \end{bmatrix}$



Per logistic  
**num\_features:** 2  
**pr\_auc:** 0.646265664160401  
**best\_precision:** 0.0  
**best\_recall:** 0.0  
**roc\_auc:** 0.577922077922078  
**f1:** 0.0  
**accuracy:** 0.56  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 11 & 0 \end{bmatrix}$

Per lasso  
**alpha:** 0.0015789473684210526  
**pr\_auc:** 0.8282942203994835  
**best\_precision:** 1.0  
**best\_recall:** 0.09090909090909091  
**roc\_auc:** 0.8116883116883117  
**f1:** 0.16666666666666669  
**accuracy:** 0.6  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 10 & 1 \end{bmatrix}$



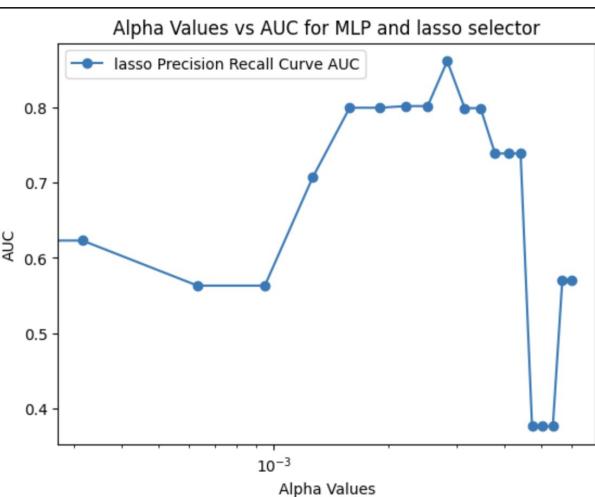
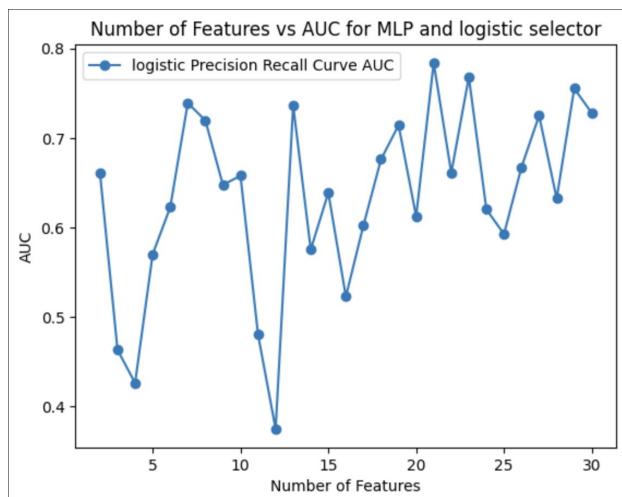
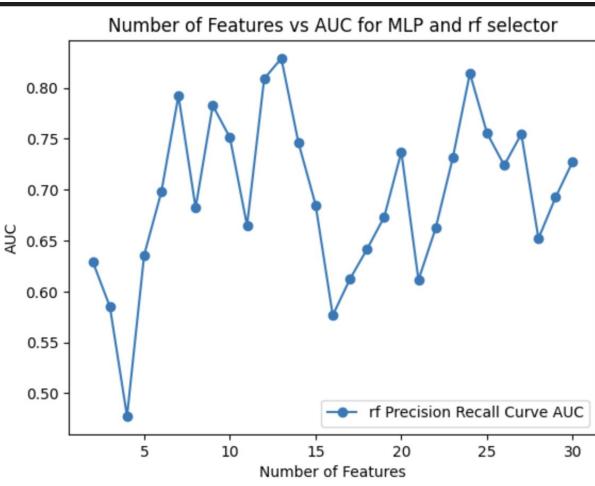
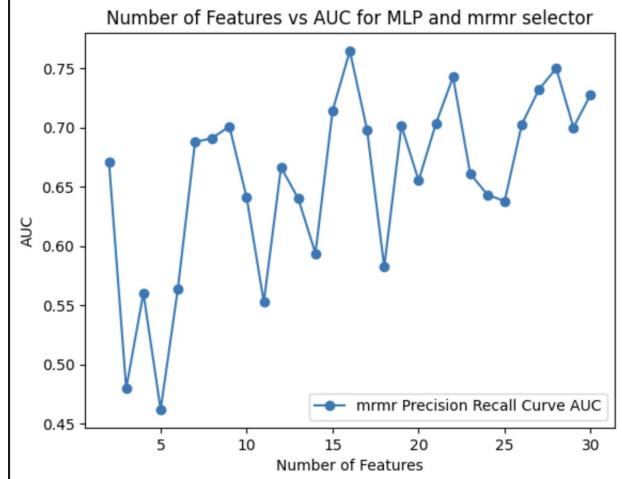
# RF

Per mrmr  
**num\_features: 26**  
pr\_auc: 0.7457781891053223  
best\_precision: 1.0  
best\_recall: 0.36363636363636365  
roc\_auc: 0.7012987012987012  
f1: 0.5333333333333333  
accuracy: 0.72  
confusion\_matrix: [14 0]  
[ 7 4]

Per rf  
**num\_features: 14 / 16**  
pr\_auc: 0.7837281624831033  
best\_precision: 0.8571428571428571  
best\_recall: 0.5454545454545454  
roc\_auc: 0.7857142857142857  
f1: 0.6666666666666665  
accuracy: 0.76  
confusion\_matrix: [13 1]  
[ 5 6]

Per logistic  
**num\_features: 21**  
pr\_auc: 0.7111568986568986  
best\_precision: 1.0  
best\_recall: 0.36363636363636365  
roc\_auc: 0.7110389610389611  
f1: 0.5333333333333333  
accuracy: 0.72  
confusion\_matrix: [14 0]  
[ 7 4]

Per lasso  
**alpha: 0.0006315789473684211**  
pr\_auc: 0.767330649148831  
best\_precision: 1.0  
best\_recall: 0.36363636363636365  
roc\_auc: 0.7662337662337663  
f1: 0.5333333333333333  
accuracy: 0.72  
confusion\_matrix: [14 0]  
[ 7 4]



**MLP**  
(128,64,32)

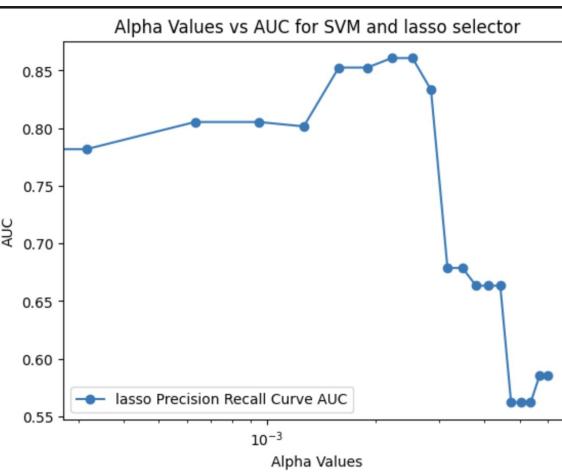
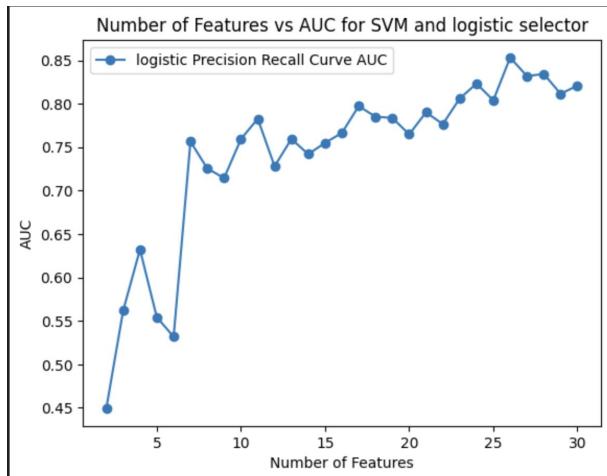
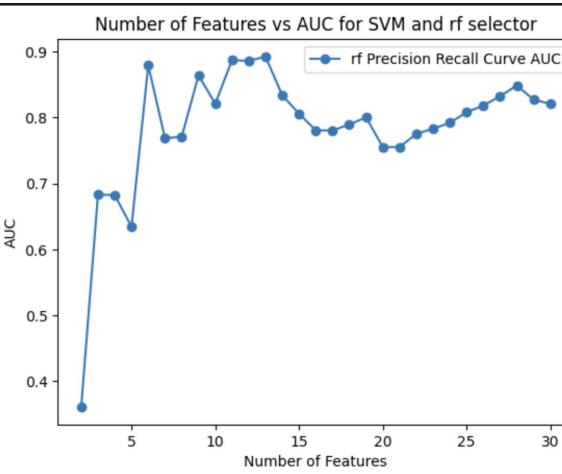
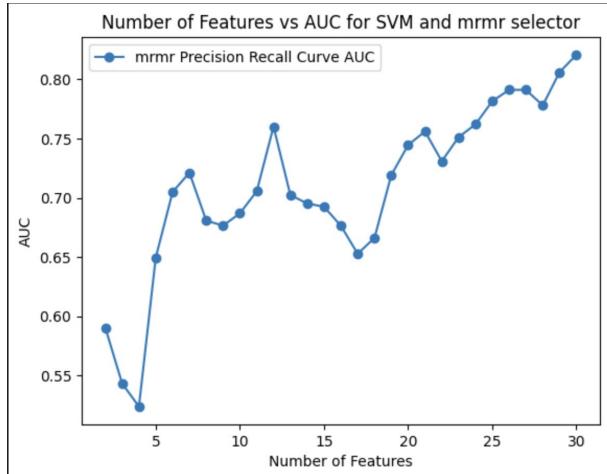
Per mrmr  
**num\_features: 14**  
**pr\_auc: 0.5936947110860155**  
**best\_precision: 0.5714285714285714**  
**best\_recall: 0.7272727272727273**  
**roc\_auc: 0.6623376623376623**  
**f1: 0.64**  
**accuracy: 0.64**  
**confusion\_matrix: [8 6]**  
**[ 3 8]**

Per rf  
**num\_features: 9**  
**pr\_auc: 0.7826340326340328**  
**best\_precision: 0.875**  
**best\_recall: 0.6363636363636364**  
**roc\_auc: 0.7987012987012987**  
**f1: 0.7368421052631579**  
**accuracy: 0.8**  
**confusion\_matrix: [13 1]**  
**[ 4 7]**

Per logistic  
**num\_features: 23**  
**pr\_auc: 0.768023643023643**  
**best\_precision: 0.7777777777777778**  
**best\_recall: 0.6363636363636364**  
**roc\_auc: 0.7857142857142857**  
**f1: 0.7000000000000001**  
**accuracy: 0.76**  
**confusion\_matrix: [12 2]**  
**[ 4 7]**

Per lasso  
**alpha: 0.0015789473684210526**  
**pr\_auc: 0.7991600790513834**  
**best\_precision: 0.625**  
**best\_recall: 0.4545454545454545**  
**roc\_auc: 0.7727272727272727**  
**f1: 0.5263157894736842**  
**accuracy: 0.64**  
**confusion\_matrix: [11 3]**  
**[ 6 5]**

# SVM



Per mrmr  
num\_features: 14  
pr\_auc: 0.6952411623464255  
best\_precision: 0.7142857142857143  
best\_recall: 0.4545454545454545  
roc\_auc: 0.7012987012987013  
f1: 0.5555555555555556  
accuracy: 0.68  
confusion\_matrix: [12 2]  
[ 6 5]

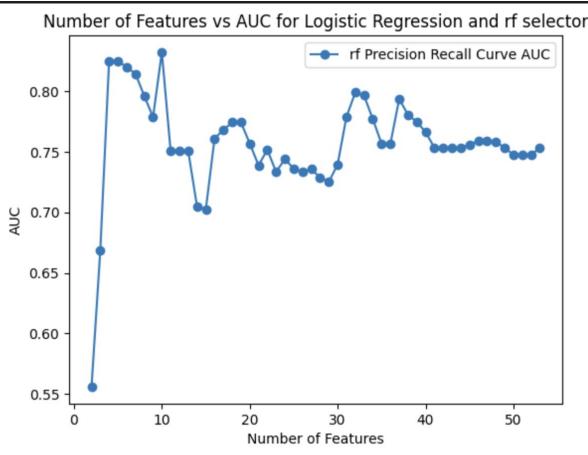
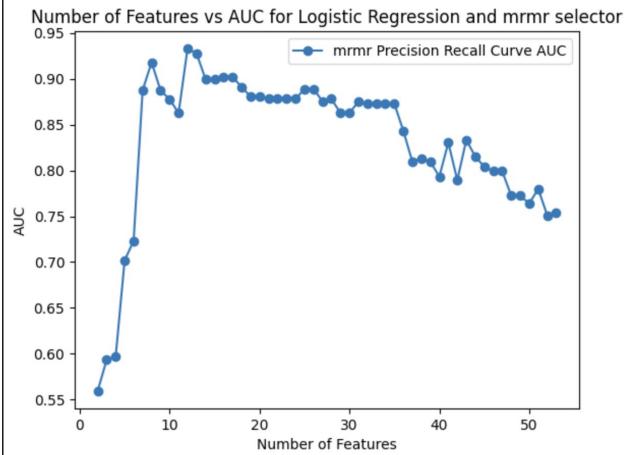
Per rf  
num\_features: 13  
pr\_auc: 0.8926468659088981  
best\_precision: 0.875  
best\_recall: 0.6363636363636364  
roc\_auc: 0.8701298701298702  
f1: 0.7368421052631579  
accuracy: 0.8  
confusion\_matrix: [13 1]  
[ 4 7]

Per logistic  
num\_features: 10  
pr\_auc: 0.7593791235502466  
best\_precision: 1.0  
best\_recall: 0.36363636363636365  
roc\_auc: 0.7532467532467533  
f1: 0.5333333333333333  
accuracy: 0.72  
confusion\_matrix: [14 0]  
[ 7 4]

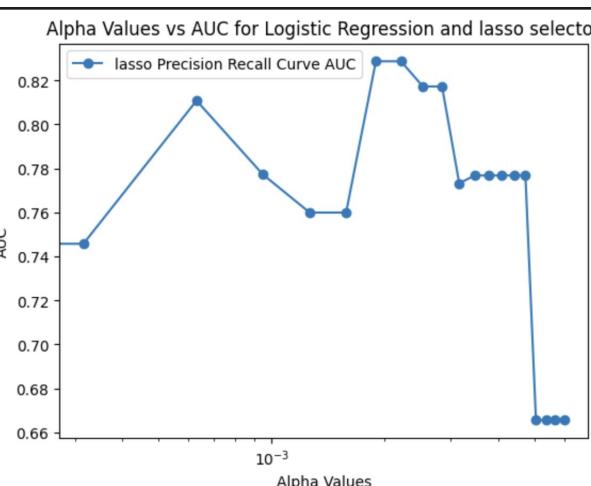
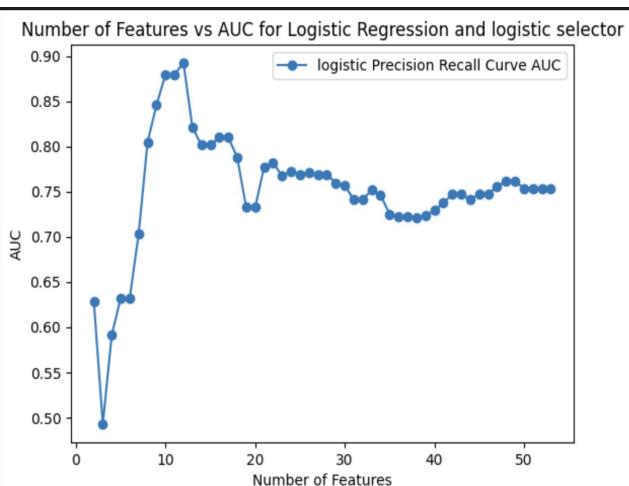
Per lasso  
alpha: 0.0012631578947368421  
pr\_auc: 0.8013614946886279  
best\_precision: 1.0  
best\_recall: 0.36363636363636365  
roc\_auc: 0.7597402597402597  
f1: 0.5333333333333333  
accuracy: 0.72  
confusion\_matrix: [14 0]  
[ 7 4]

# 64 features

Correlation (0.85%) 64 → 53 features



```
LOG  
(male) Per mrmr  
num_features: 14  
pr_auc: 0.8994949494949496  
best_precision: 1.0  
best_recall: 0.18181818181818182  
roc_auc: 0.8766233766233766  
f1: 0.3076923076923077  
accuracy: 0.64  
confusion_matrix: [14  0  
                   [ 9  2]]
```



```
Per logistic  
num_features: 8  
pr_auc: 0.8049717958808867  
best_precision: 1.0  
best_recall: 0.18181818181818182  
roc_auc: 0.8571428571428572  
f1: 0.3076923076923077  
accuracy: 0.64  
confusion_matrix: [14  0]  
                  [ 9  2]
```

```
Per lasso
alpha: 0.0018947368421052633
pr_auc: 0.8286897445988356
best_precision: 0.8
best_recall: 0.36363636363636365
roc_auc: 0.8636363636363636
f1: 0.5000000000000001
accuracy: 0.68
confusion_matrix: [13  1]
                  [ 7  4]
```

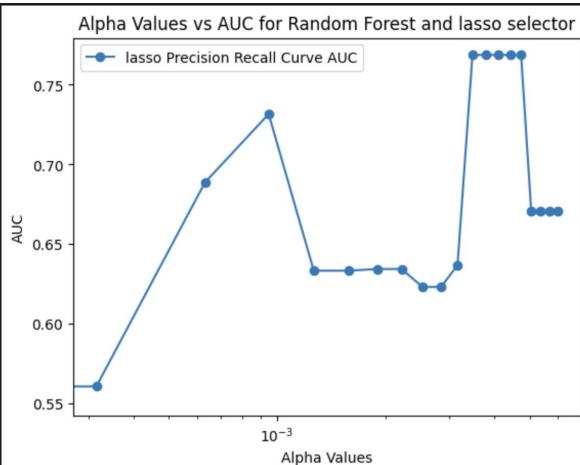
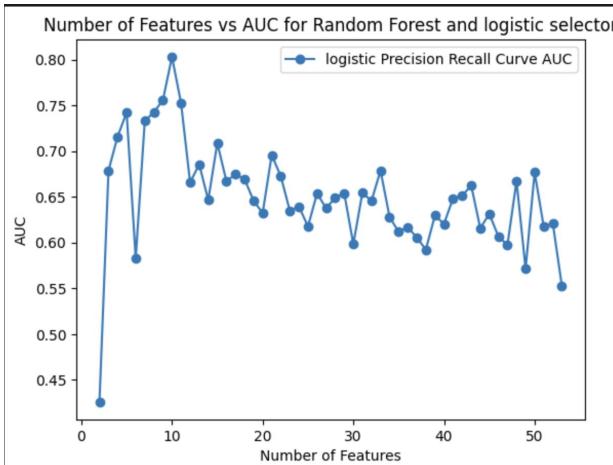
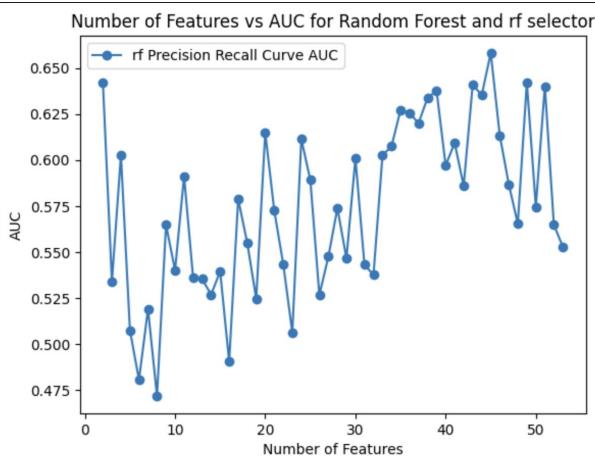
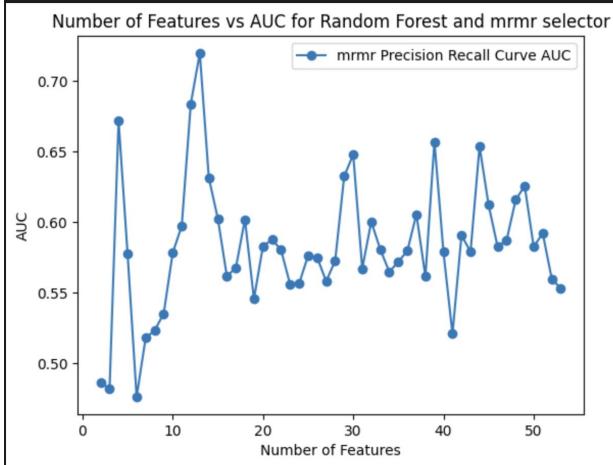
# RF

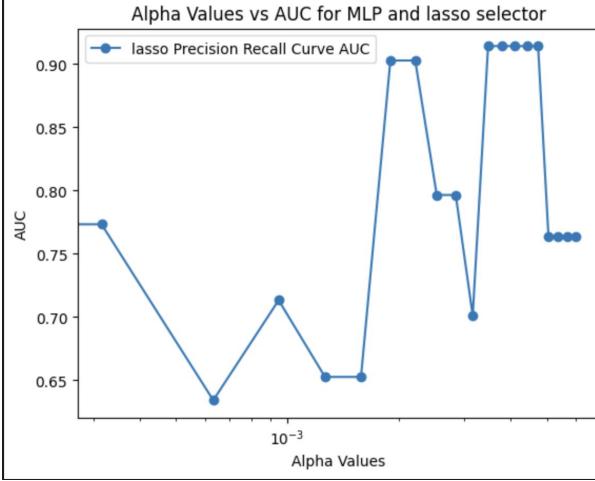
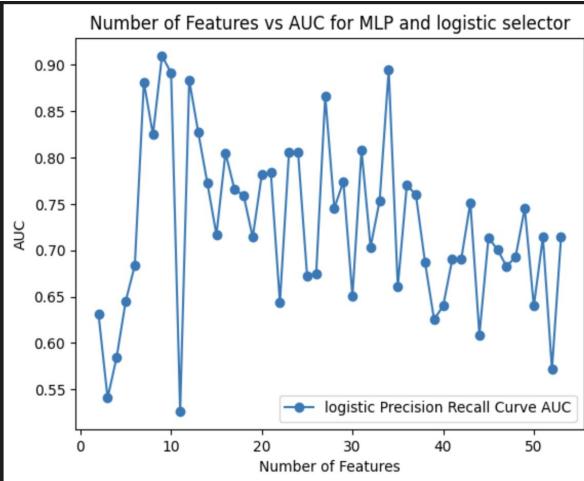
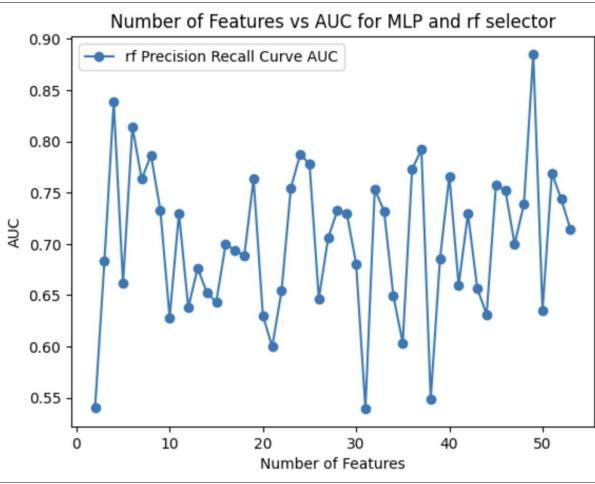
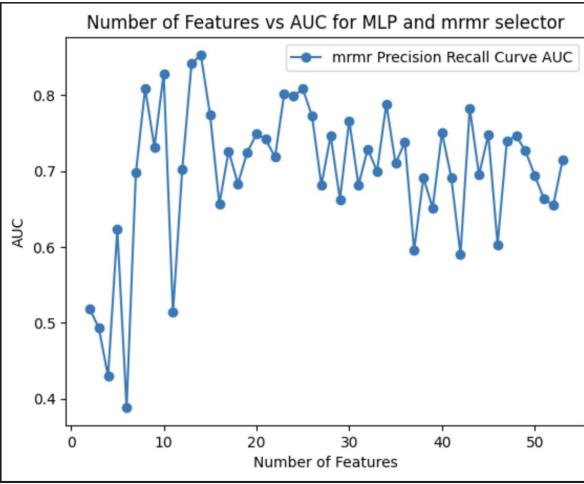
Per mrmr  
**num\_features: 4**  
pr\_auc: 0.6715564738292011  
best\_precision: 0.7142857142857143  
best\_recall: 0.4545454545454545  
roc\_auc: 0.6428571428571428  
f1: 0.5555555555555556  
accuracy: 0.68  
confusion\_matrix: [12 2]  
[ 6 5]

Per rf  
**num\_features: 39**  
pr\_auc: 0.6375611316787787  
best\_precision: 1.0  
best\_recall: 0.2727272727272727  
roc\_auc: 0.6168831168831169  
f1: 0.42857142857142855  
accuracy: 0.68  
confusion\_matrix: [14 0]  
[ 8 3]

Per logistic  
**num\_features: 9**  
pr\_auc: 0.7556981296215747  
best\_precision: 0.7142857142857143  
best\_recall: 0.4545454545454545  
roc\_auc: 0.7532467532467532  
f1: 0.5555555555555556  
accuracy: 0.68  
confusion\_matrix: [12 2]  
[ 6 5]

Per lasso  
**alpha: 0.0006315789473684211**  
pr\_auc: 0.6886519600423343  
best\_precision: 0.8  
best\_recall: 0.3636363636363636  
roc\_auc: 0.6948051948051948  
f1: 0.5000000000000001  
accuracy: 0.68  
confusion\_matrix: [13 1]  
[ 7 4]





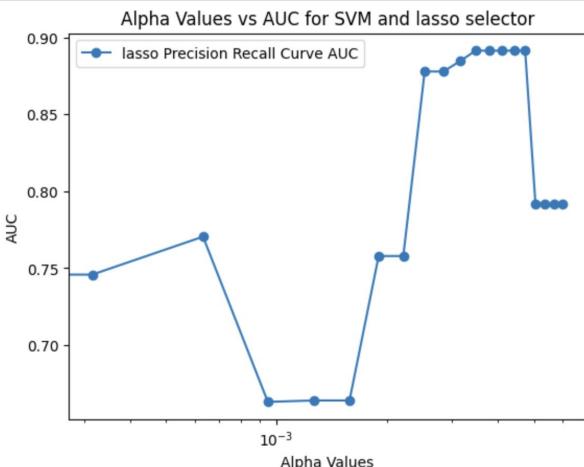
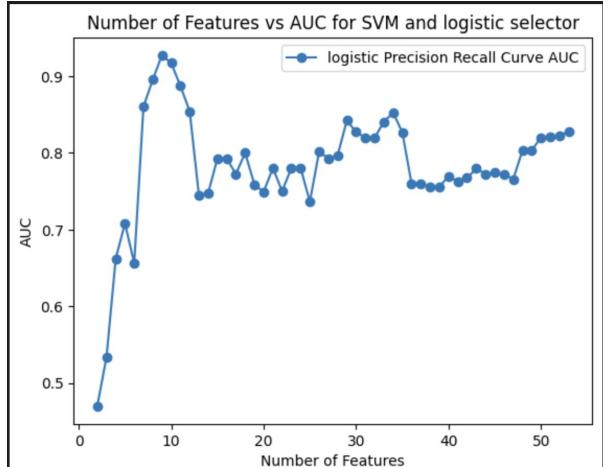
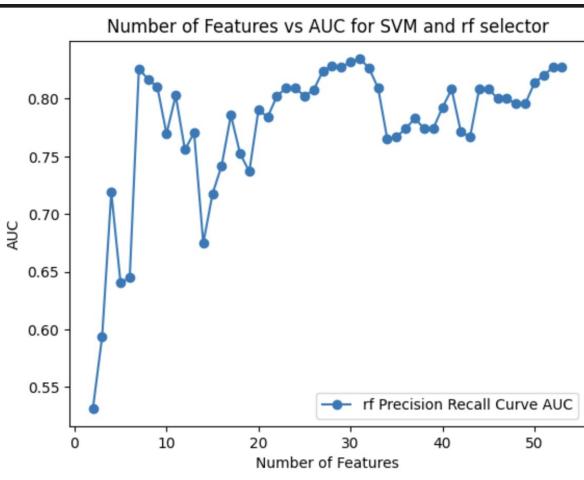
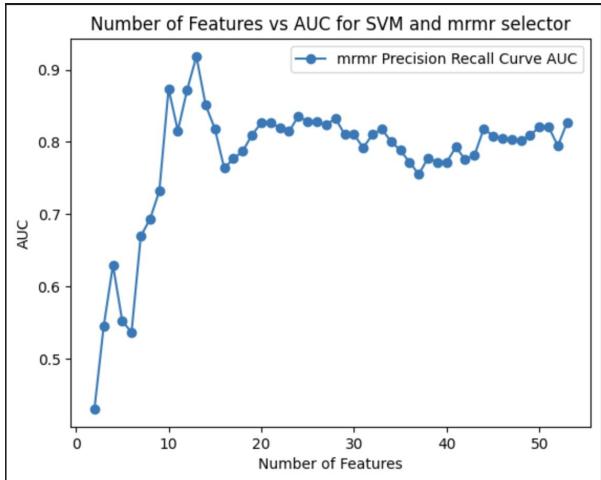
**MLP**  
(128,64,32)

Per mrmr  
**num\_features:** 24  
 pr\_auc: 0.7988139311668724  
 best\_precision: 0.8571428571428571  
 best\_recall: 0.5454545454545454  
 roc\_auc: 0.7987012987012987  
 f1: 0.6666666666666666  
 accuracy: 0.76  
 confusion\_matrix: [13 1]  
                   [ 5 6]

Per rf  
**num\_features:** 13  
 pr\_auc: 0.6765658583840403  
 best\_precision: 0.6363636363636364  
 best\_recall: 0.6363636363636364  
 roc\_auc: 0.7207792207792209  
 f1: 0.6363636363636364  
 accuracy: 0.68  
 confusion\_matrix: [10 4]  
                   [ 4 7]

Per logistic  
**num\_features:** 9  
 pr\_auc: 0.9095959595959596  
 best\_precision: 0.7777777777777778  
 best\_recall: 0.6363636363636364  
 roc\_auc: 0.8831168831168832  
 f1: 0.7000000000000001  
 accuracy: 0.76  
 confusion\_matrix: [12 2]  
                   [ 4 7]

**Per lasso**  
 alpha: 0.003473684210526316  
 pr\_auc: 0.9141414141414143  
 best\_precision: 0.8888888888888888  
 best\_recall: 0.7272727272727273  
 roc\_auc: 0.8766233766233766  
 f1: 0.7999999999999999  
 accuracy: 0.84  
 confusion\_matrix: [13 1]  
                   [ 3 8]



# SVM

Per mrmr

```
num_features: 10
pr_auc: 0.873745572609209
best_precision: 1.0
best_recall: 0.36363636363636365
roc_auc: 0.8896103896103895
f1: 0.5333333333333333
accuracy: 0.72
confusion_matrix: [14  0]
[ 7  4]
```

Per rf

```
num_features: 9
pr_auc: 0.8103515391064798
best_precision: 1.0
best_recall: 0.36363636363636365
roc_auc: 0.7857142857142858
f1: 0.5333333333333333
accuracy: 0.72
confusion_matrix: [14  0]
[ 7  4]
```

Per logistic

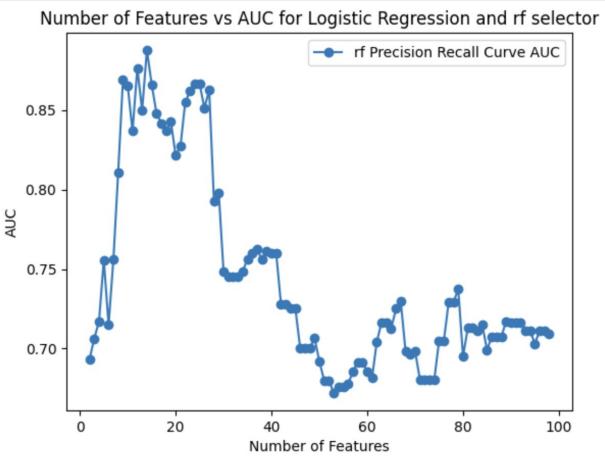
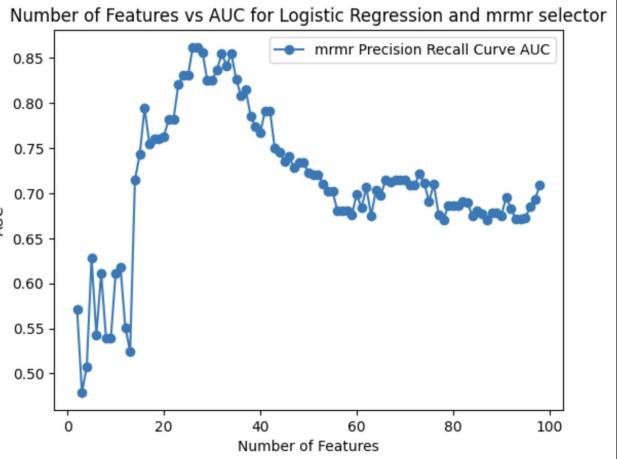
```
num_features: 33
pr_auc: 0.8404040404040404
best_precision: 0.8571428571428571
best_recall: 0.5454545454545454
roc_auc: 0.8506493506493507
f1: 0.6666666666666665
accuracy: 0.76
confusion_matrix: [13  1]
[ 5  6]
```

Per lasso

```
alpha: 0.0018947368421052633
pr_auc: 0.7578849040536347
best_precision: 0.833333333333333
best_recall: 0.4545454545454545
roc_auc: 0.7662337662337662
f1: 0.5882352941176471
accuracy: 0.72
confusion_matrix: [13  1]
[ 6  5]
```

# 128 features

Correlation (0.85%) 128 → 98 features



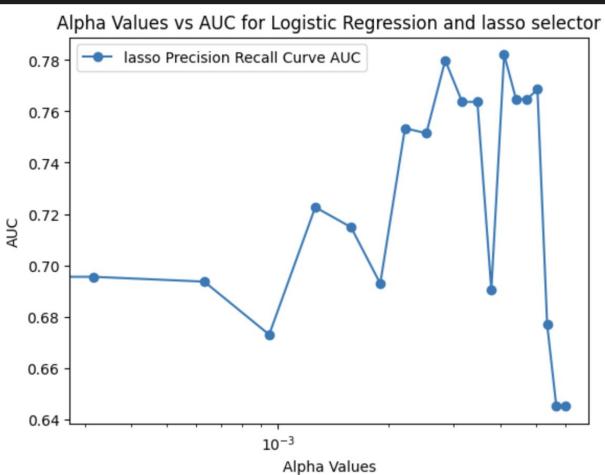
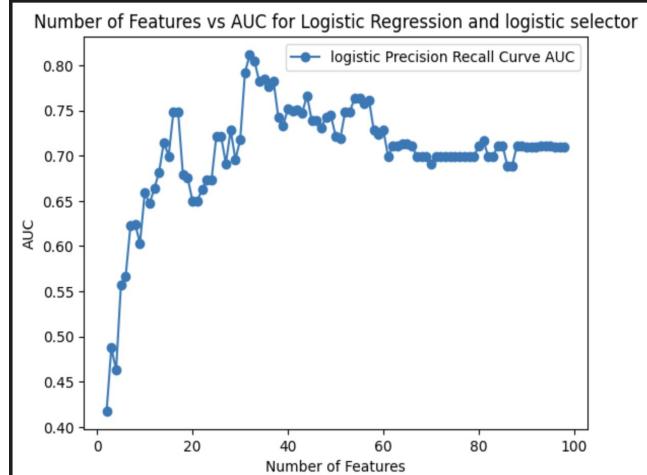
# LOG

Per mrmr  
**num\_features:** 26  
**pr\_auc:** 0.8619863078465118  
**best\_precision:** 1.0  
**best\_recall:** 0.18181818181818182  
**roc\_auc:** 0.8246753246753247  
**f1:** 0.3076923076923077  
**accuracy:** 0.64  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 9 & 2 \end{bmatrix}$

Per rf  
**num\_features:** 16  
**pr\_auc:** 0.8480421094057458  
**best\_precision:** 1.0  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.8116883116883117  
**f1:** 0.42857142857142855  
**accuracy:** 0.68  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 8 & 3 \end{bmatrix}$

Per logistic  
**num\_features:** 23  
**pr\_auc:** 0.6736808599037701  
**best\_precision:** 1.0  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.7207792207792207  
**f1:** 0.42857142857142855  
**accuracy:** 0.68  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 8 & 3 \end{bmatrix}$

Per lasso  
**alpha:** 0.003157894736842105  
**pr\_auc:** 0.7637080310993355  
**best\_precision:** 1.0  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.7467532467532468  
**f1:** 0.42857142857142855  
**accuracy:** 0.68  
**confusion\_matrix:**  $\begin{bmatrix} 14 & 0 \\ 8 & 3 \end{bmatrix}$



# RF

Per mrmr

**num\_features:** 17  
**pr\_auc:** 0.6194956824822585  
**best\_precision:** 1.0  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.6168831168831168  
**f1:** 0.42857142857142855  
**accuracy:** 0.68  
**confusion\_matrix:** [14 0]  
[ 8 3]

Per rf

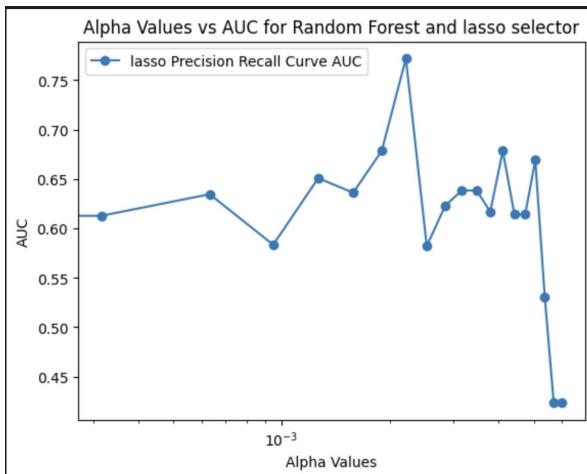
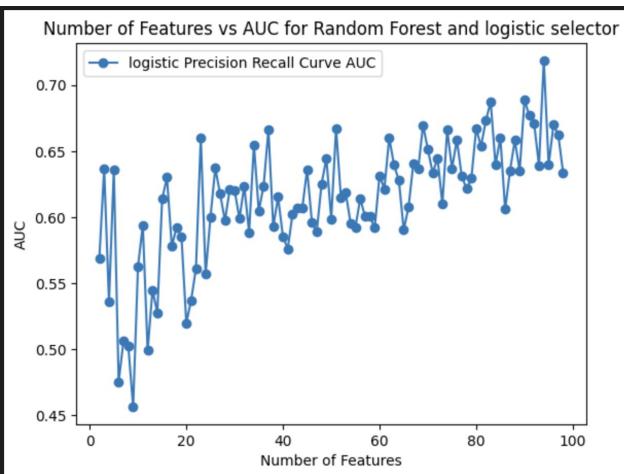
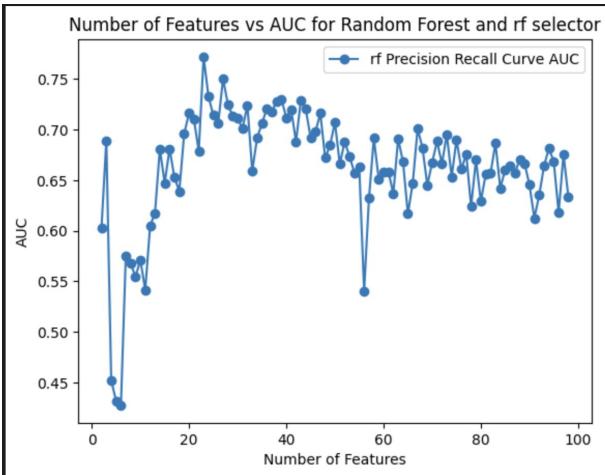
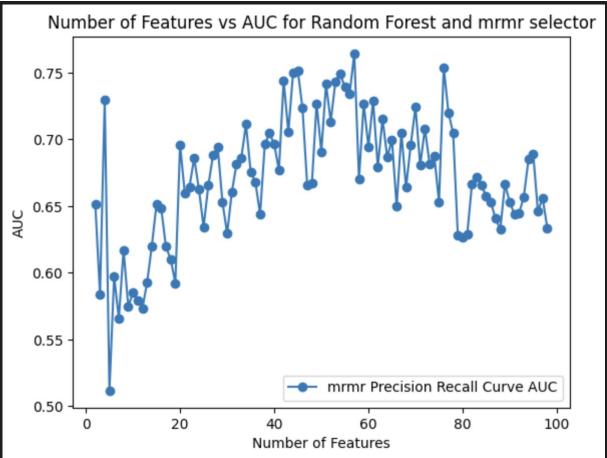
**num\_features:** 2  
**pr\_auc:** 0.6026973026973027  
**best\_precision:** 1.0  
**best\_recall:** 0.36363636363636365  
**roc\_auc:** 0.6753246753246753  
**f1:** 0.5333333333333333  
**accuracy:** 0.72  
**confusion\_matrix:** [14 0]  
[ 7 4]

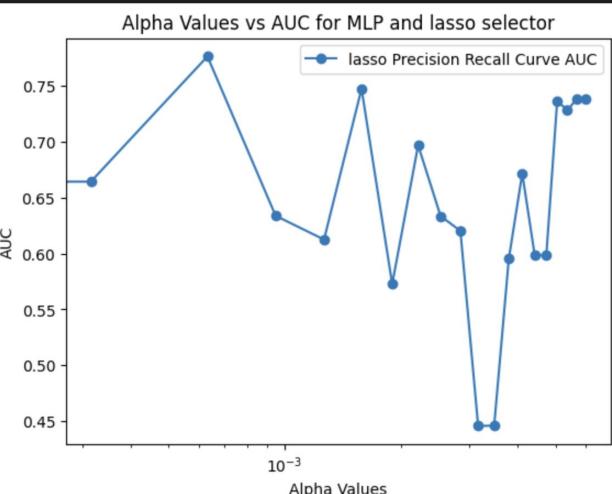
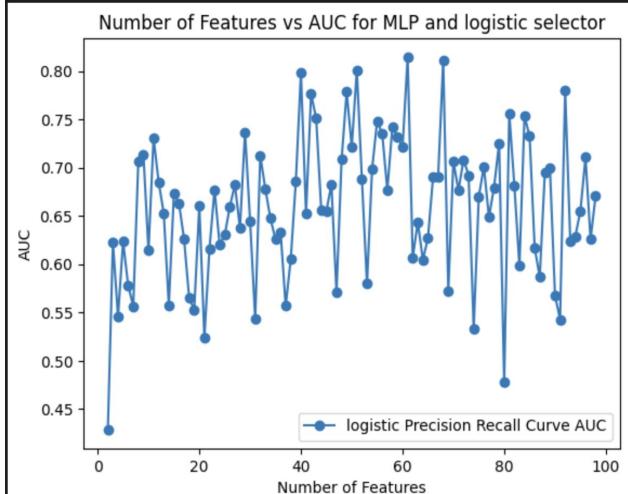
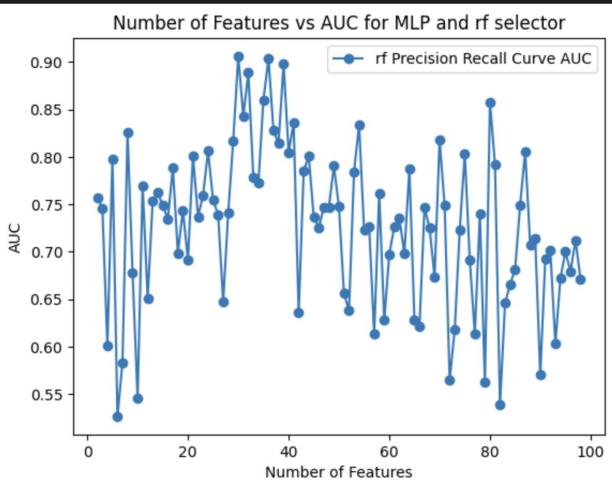
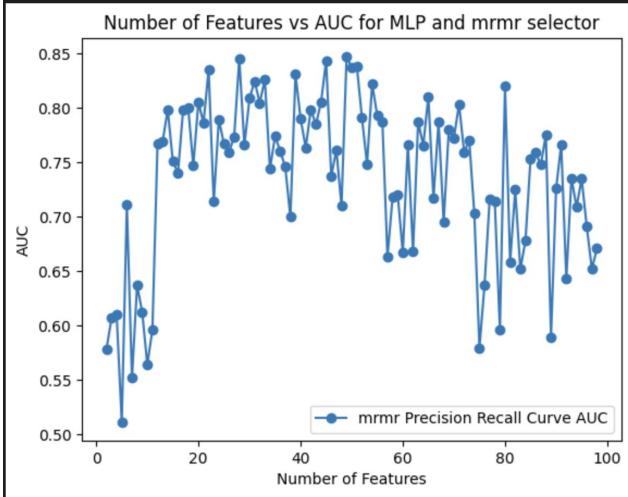
Per logistic

**num\_features:** 22  
**pr\_auc:** 0.5611069287585765  
**best\_precision:** 1.0  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.6168831168831168  
**f1:** 0.42857142857142855  
**accuracy:** 0.68  
**confusion\_matrix:** [14 0]  
[ 8 3]

Per lasso

**alpha:** 0.0  
**pr\_auc:** 0.6334391021673049  
**best\_precision:** 1.0  
**best\_recall:** 0.2727272727272727  
**roc\_auc:** 0.5909090909090909  
**f1:** 0.42857142857142855  
**accuracy:** 0.68  
**confusion\_matrix:** [14 0]  
[ 8 3]





**MLP**  
128,64,32)

#### Per mrmr

```
num_features: 18
pr_auc: 0.8003901799954433
best_precision: 0.875
best_recall: 0.6363636363636364
roc_auc: 0.7987012987012987
f1: 0.7368421052631579
accuracy: 0.8
confusion_matrix: [13 1]
[ 4 7]
```

#### Per rf

```
num_features: 39
pr_auc: 0.8977272727272727
best_precision: 1.0
best_recall: 0.5454545454545454
roc_auc: 0.8701298701298702
f1: 0.7058823529411764
accuracy: 0.8
confusion_matrix: [14 0]
[ 5 6]
```

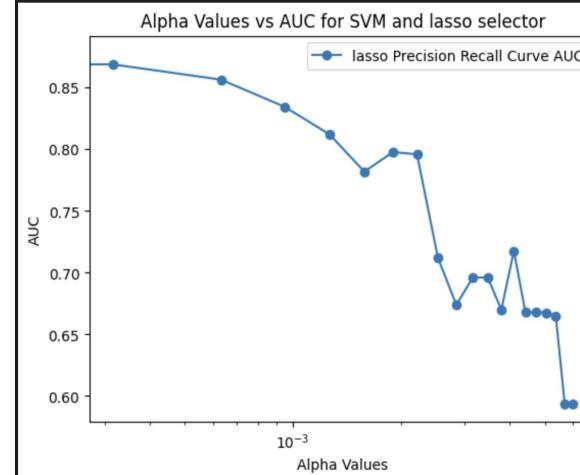
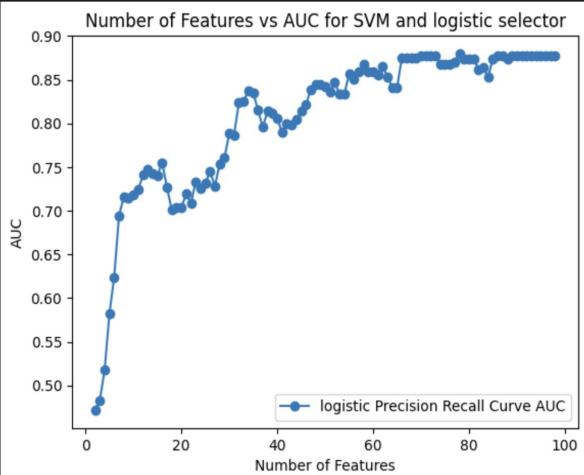
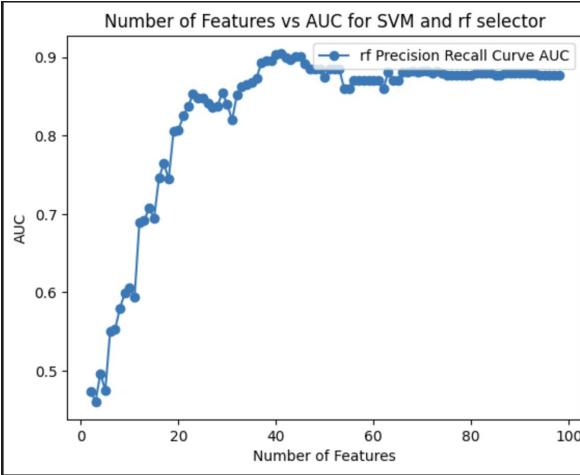
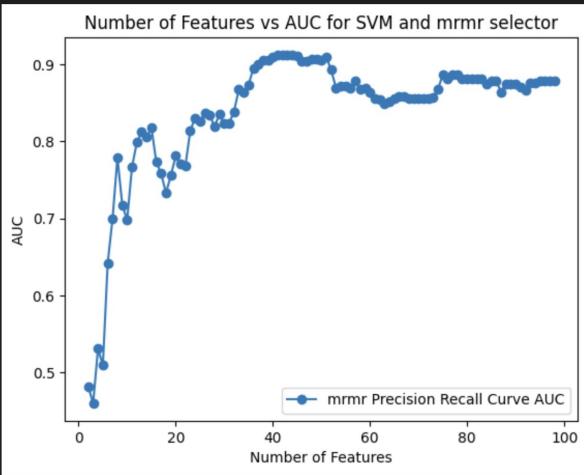
#### Per logistic

```
num_features: 92
pr_auc: 0.7804912478825522
best_precision: 0.72727272727273
best_recall: 0.72727272727273
roc_auc: 0.7727272727272727
f1: 0.7272727272727273
accuracy: 0.76
confusion_matrix: [11 3]
[ 3 8]
```

#### Per lasso

```
alpha: 0.005368421052631579
pr_auc: 0.7282833547655683
best_precision: 0.8571428571428571
best_recall: 0.5454545454545454
roc_auc: 0.7402597402597403
f1: 0.6666666666666666
accuracy: 0.76
confusion_matrix: [13 1]
[ 5 6]
```

# SVM



Per mrmr  
num\_features: 28  
pr\_auc: 0.8194600806829909  
best\_precision: 0.875  
best\_recall: 0.6363636363636364  
roc\_auc: 0.7792207792207793  
f1: 0.7368421052631579  
accuracy: 0.8  
confusion\_matrix: [13 1]  
[ 4 7]

Per rf  
num\_features: 36  
pr\_auc: 0.8732323232323232  
best\_precision: 1.0  
best\_recall: 0.5454545454545454  
roc\_auc: 0.8441558441558442  
f1: 0.7058823529411764  
accuracy: 0.8  
confusion\_matrix: [14 0]  
[ 5 6]

Per logistic  
num\_features: 25  
pr\_auc: 0.7313319303362928  
best\_precision: 1.0  
best\_recall: 0.4545454545454545  
roc\_auc: 0.6428571428571427  
f1: 0.625  
accuracy: 0.76  
confusion\_matrix: [14 0]  
[ 6 5]

Per lasso  
alpha: 0.0006315789473684211  
pr\_auc: 0.8563131313131314  
best\_precision: 1.0  
best\_recall: 0.4545454545454545  
roc\_auc: 0.8246753246753247  
f1: 0.625  
accuracy: 0.76  
confusion\_matrix: [14 0]  
[ 6 5]

# 64 features

randomstate = 74.

threshold variabile e majority voting,  
no Smote

# Randomforest

Per rf

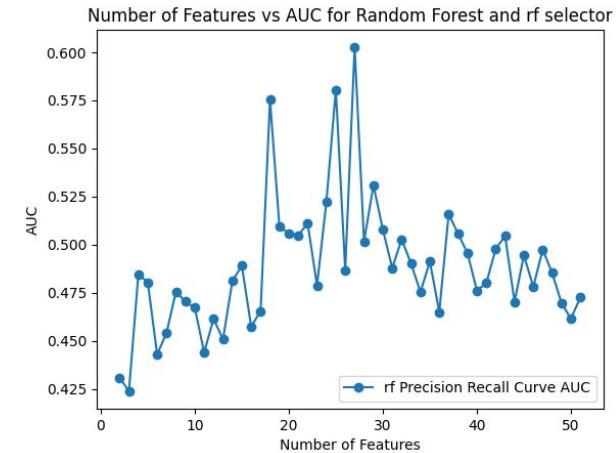
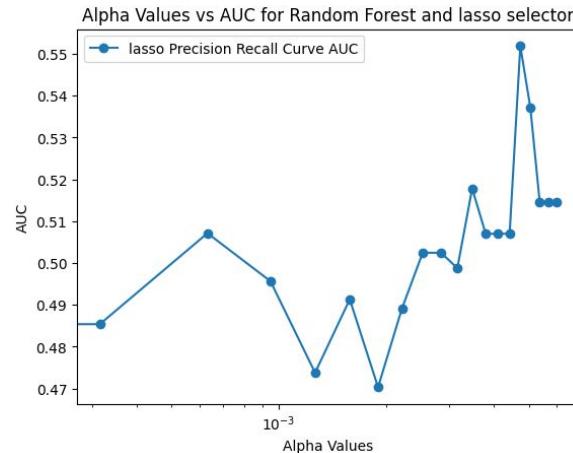
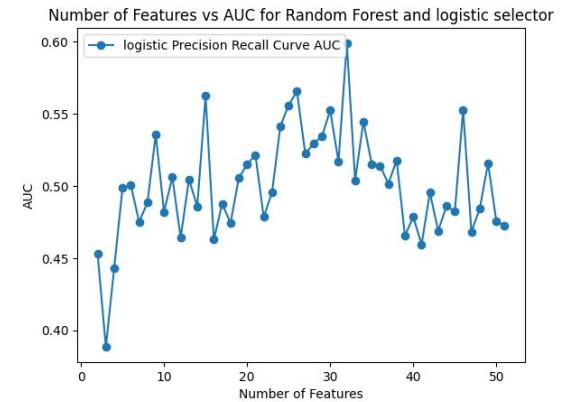
```
num_features: 20
pr_auc: 0.5056551635499005
best_precision: 0.5238095238095238
best_recall: 1.0
roc_auc: 0.5714285714285714
f1: 0.6875
accuracy: 0.6
confusion_matrix: [[ 4 10]
 [ 0 11]]
best_threshold: 0.3
```

Per logistic

```
num_features: 24
pr_auc: 0.541389418662146
best_precision: 0.5555555555555556
best_recall: 0.9090909090909091
roc_auc: 0.6428571428571428
f1: 0.6896551724137931
accuracy: 0.64
confusion_matrix: [[ 6  8]
 [ 1 10]]
best_threshold: 0.38
```

Per lasso

```
alpha: 0.0022105263157894735
pr_auc: 0.4891197112453797
best_precision: 0.5789473684210527
best_recall: 1.0
roc_auc: 0.6103896103896104
f1: 0.7333333333333333
accuracy: 0.68
confusion_matrix: [[ 6  8]
 [ 0 11]]
best_threshold: 0.35000000000000003
```



### Per rf

```
num_features: 26
pr_auc: 0.5631553977810663
best_precision: 0.6666666666666666
best_recall: 0.9090909090909091
roc_auc: 0.6363636363636364
f1: 0.7692307692307693
accuracy: 0.76
confusion_matrix: [[ 9  5]
                     [ 1 10]]
best_threshold: 0.354
```

### Per logistic

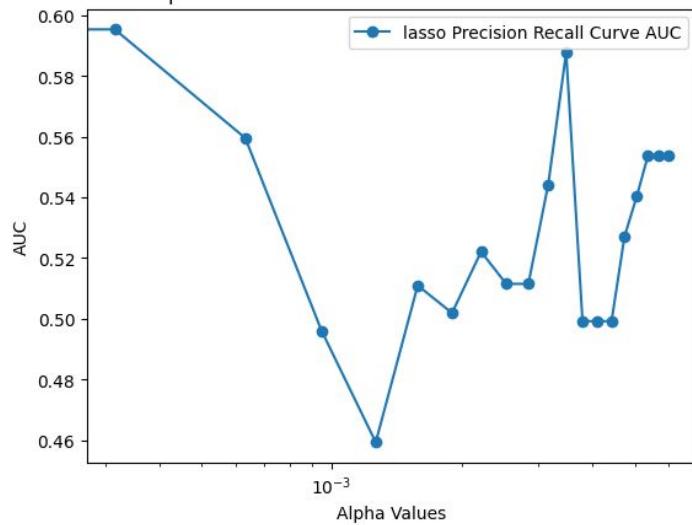
```
num_features: 27
pr_auc: 0.6584149370034538
best_precision: 0.625
best_recall: 0.9090909090909091
roc_auc: 0.7012987012987013
f1: 0.7407407407407407
accuracy: 0.72
confusion_matrix: [[ 8  6]
                     [ 1 10]]
best_threshold: 0.321
```

### Per lasso

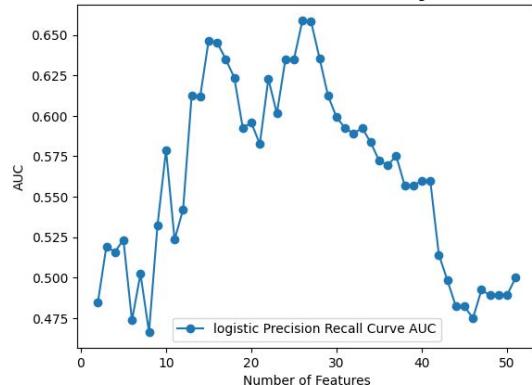
```
alpha: 0.0006315789473684211
pr_auc: 0.5595518044047456
best_precision: 0.5882352941176471
best_recall: 0.9090909090909091
roc_auc: 0.6298701298701299
f1: 0.7142857142857143
accuracy: 0.68
confusion_matrix: [[ 7  7]
                     [ 1 10]]
best_threshold: 0.33
```

# SVM

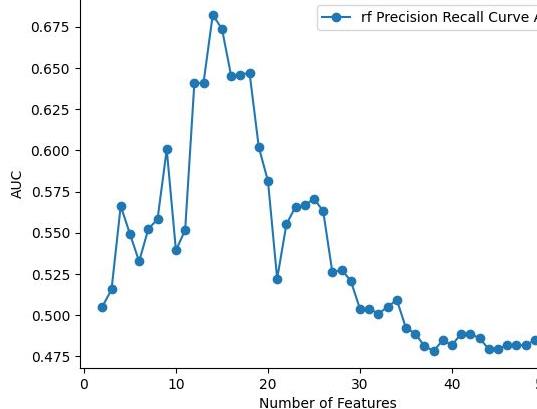
Alpha Values vs AUC for SVM and lasso selector

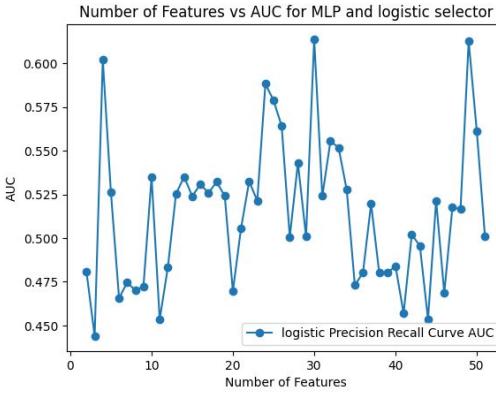
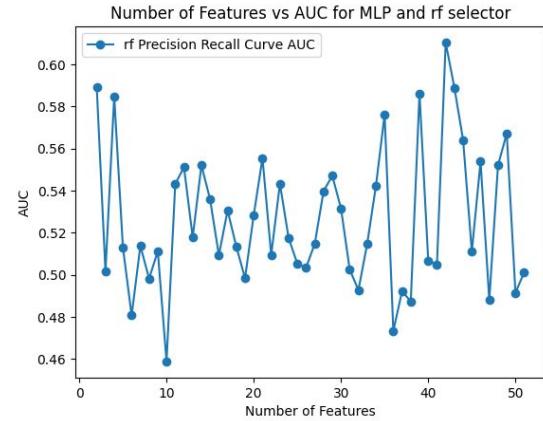


Number of Features vs AUC for SVM and logistic selector



Number of Features vs AUC for SVM and rf selector





Per rf

num\_features: 30

pr\_auc: 0.5315934065934066

best\_precision: 0.6923076923076923

best\_recall: 0.8181818181818182

roc\_auc: 0.6428571428571429

f1: 0.75

accuracy: 0.76

confusion\_matrix: [[10 4]  
[ 2 9]]

best\_threshold: 0.396

Per logistic

num\_features: 27

pr\_auc: 0.500617982495973

best\_precision: 0.6428571428571429

best\_recall: 0.8181818181818182

roc\_auc: 0.6168831168831168

f1: 0.72

accuracy: 0.72

confusion\_matrix: [[9 5]  
[ 2 9]]

best\_threshold: 0.448

Per lasso

alpha: 0.0037894736842105266

pr\_auc: 0.6216668358379588

best\_precision: 0.6923076923076923

best\_recall: 0.8181818181818182

roc\_auc: 0.7402597402597403

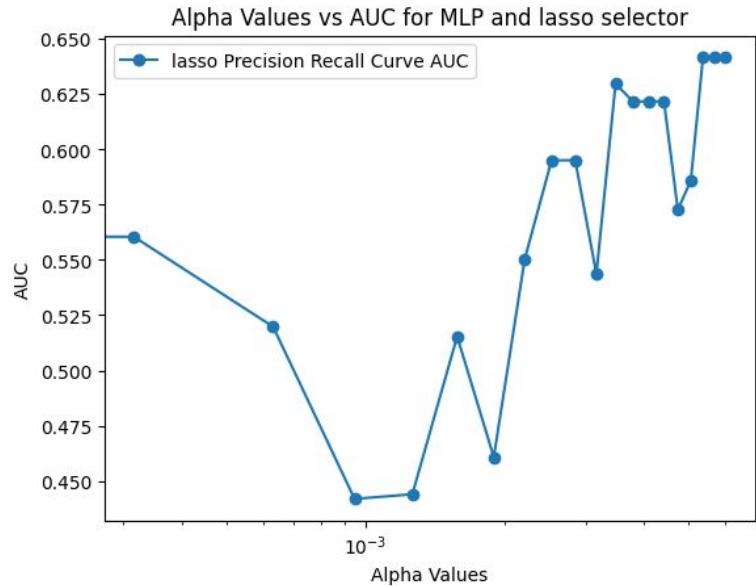
f1: 0.75

accuracy: 0.76

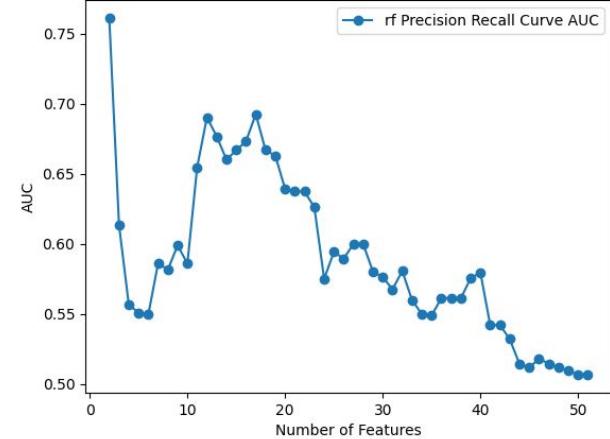
confusion\_matrix: [[10 4]  
[ 2 9]]

best\_threshold: 0.421

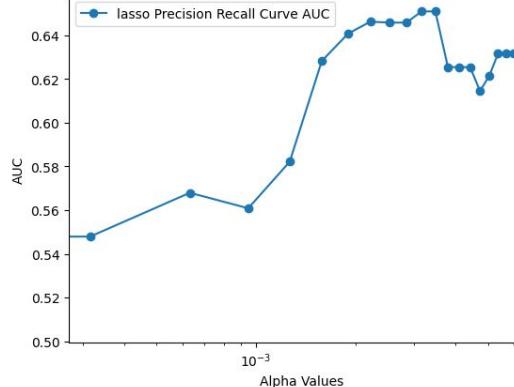
# MLP



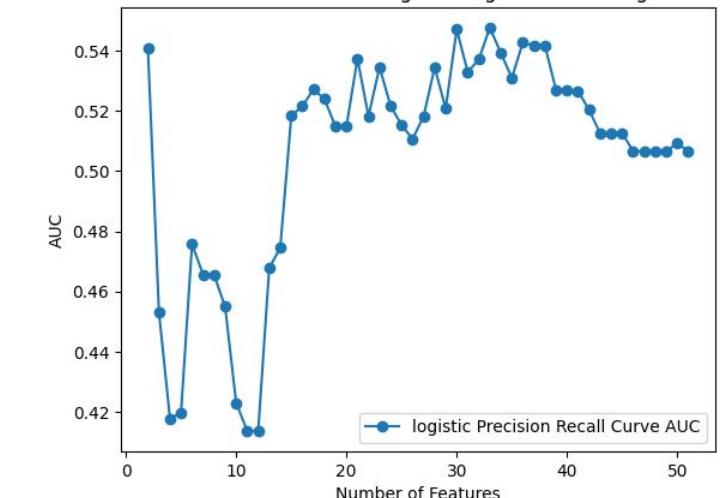
Number of Features vs AUC for Logistic Regression and rf selector



Alpha Values vs AUC for Logistic Regression and lasso selector



Number of Features vs AUC for Logistic Regression and logistic selector



# Logistic

**Per rf**

```
num_features: 27
pr_auc: 0.5996971388682618
best_precision: 0.6111111111111112
best_recall: 1.0
roc_auc: 0.7272727272727273
f1: 0.7586206896551724
accuracy: 0.72
confusion_matrix: [[ 7  7]
                   [ 0 11]]
best_threshold: 0.392
```

**Per logistic**

```
num_features: 17
pr_auc: 0.5271417909575804
best_precision: 0.6470588235294118
best_recall: 1.0
roc_auc: 0.6428571428571428
f1: 0.7857142857142857
accuracy: 0.76
confusion_matrix: [[ 8  6]
                   [ 0 11]]
best_threshold: 0.401
```

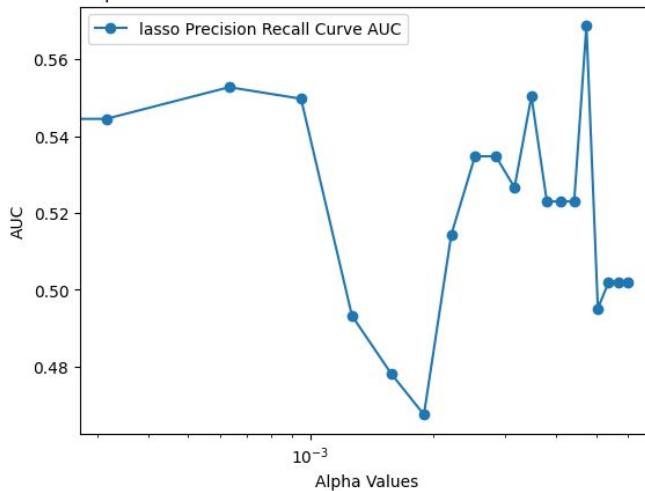
**Per lasso**

```
alpha: 0.0037894736842105266
pr_auc: 0.6253978204301874
best_precision: 0.6470588235294118
best_recall: 1.0
roc_auc: 0.7597402597402598
f1: 0.7857142857142857
accuracy: 0.76
confusion_matrix: [[ 8  6]
                   [ 0 11]]
best_threshold: 0.40700000000000000000000000000003
```

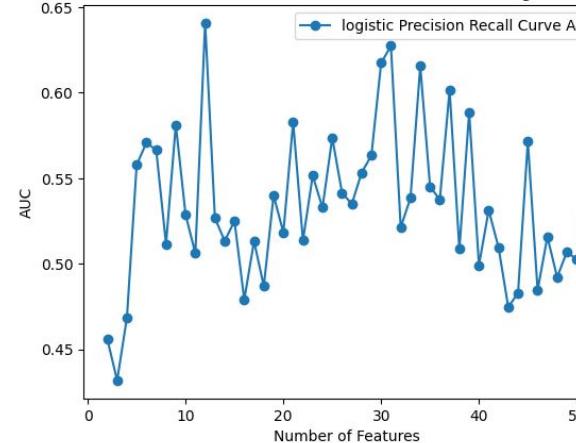
# 64 features

randomstate = 74.  
threshold variabile e predizioni con mean,  
Smote

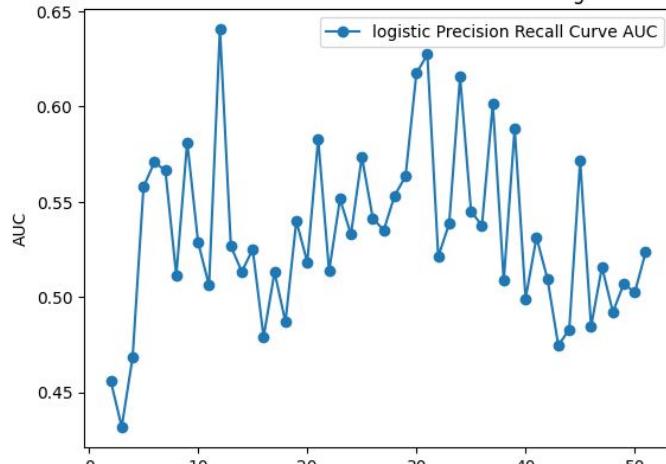
Alpha Values vs AUC for Random Forest and lasso selector



Number of Features vs AUC for Random Forest and logistic selector



Number of Features vs AUC for Random Forest and logistic selector



# RandomForest

Per rf

```

num_features: 39
pr_auc: 0.546203247139076
best_precision: 0.5555555555555555
best_recall: 0.9090909090909091
roc_auc: 0.6558441558441559
f1: 0.6896551724137931
accuracy: 0.64
confusion_matrix: [[ 6  8]
 [ 1 10]]
best_threshold: 0.394

```

Per logistic

```

num_features: 34
pr_auc: 0.6155982831784971
best_precision: 0.5882352941176471
best_recall: 0.9090909090909091
roc_auc: 0.6298701298701299
f1: 0.7142857142857143
accuracy: 0.68
confusion_matrix: [[ 7  7]
 [ 1 10]]
best_threshold: 0.41700000000000004

```

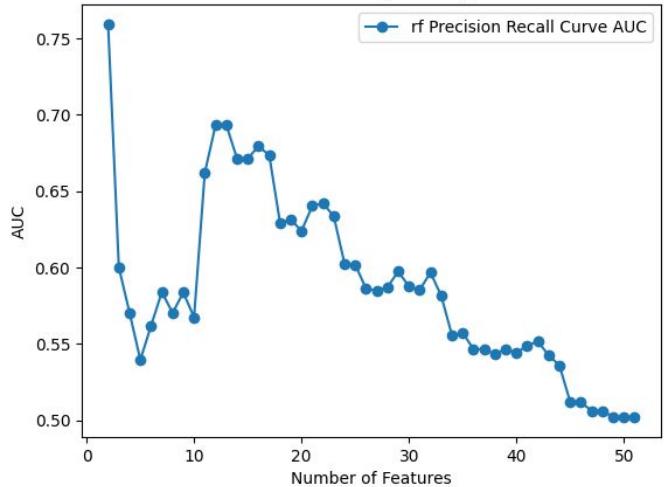
Per lasso

```

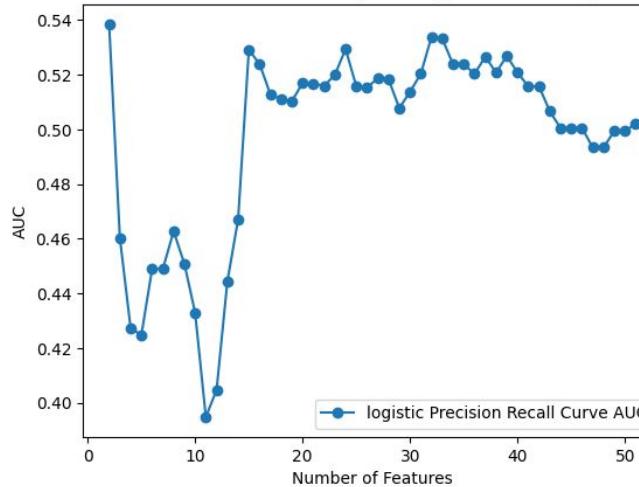
alpha: 0.004736842105263158
pr_auc: 0.5686810960875132
best_precision: 0.6470588235294118
best_recall: 1.0
roc_auc: 0.7272727272727273
f1: 0.7857142857142857
accuracy: 0.76
confusion_matrix: [[ 8  6]
 [ 0 11]]
best_threshold: 0.459

```

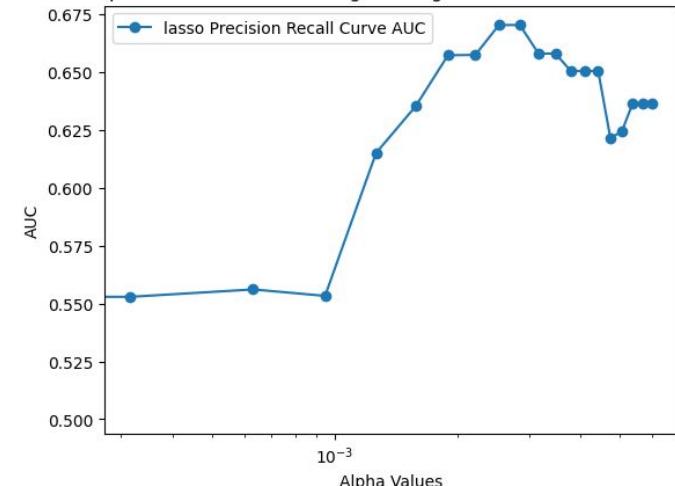
Number of Features vs AUC for Logistic Regression and rf selector



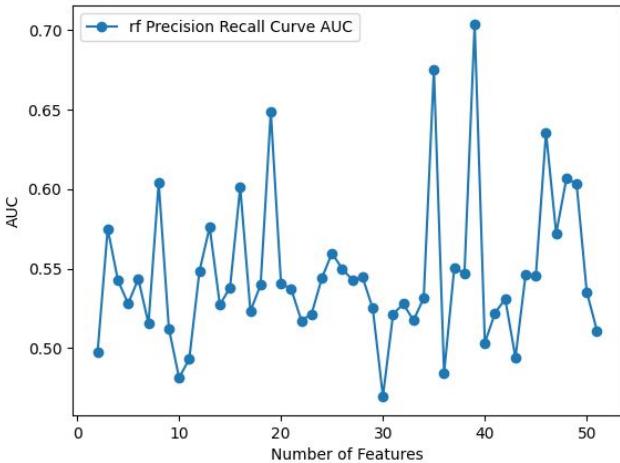
Number of Features vs AUC for Logistic Regression and logistic selector



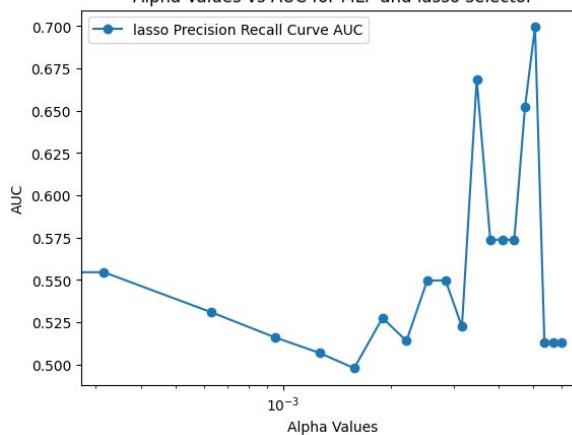
Alpha Values vs AUC for Logistic Regression and lasso selector



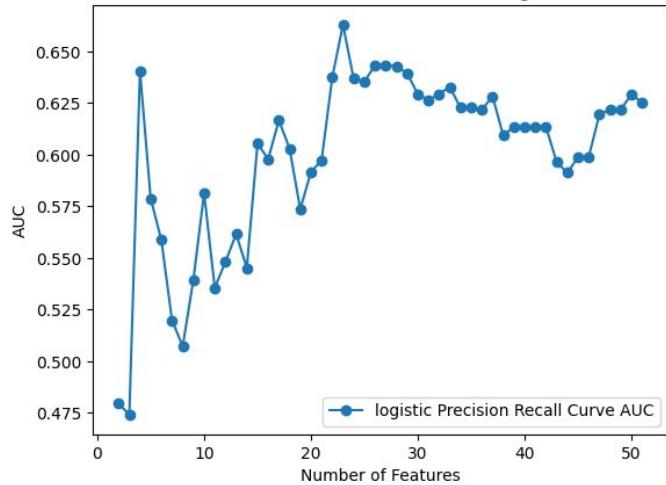
Number of Features vs AUC for MLP and rf selector



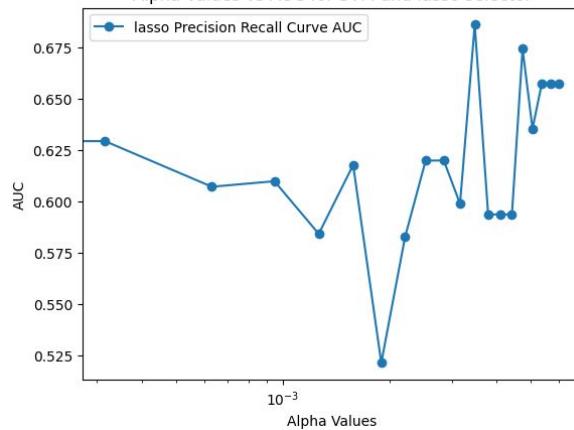
Alpha Values vs AUC for MLP and lasso selector



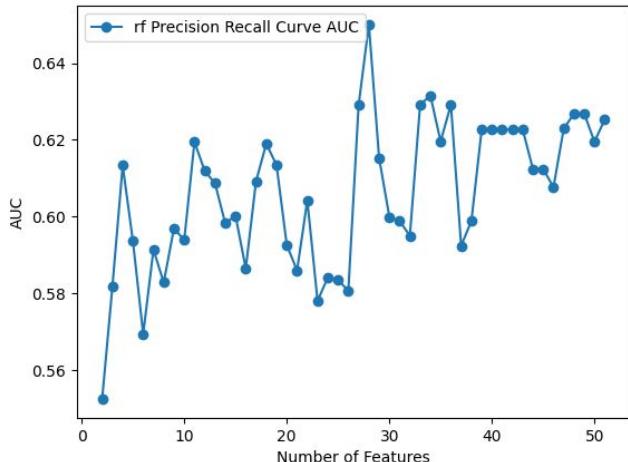
Number of Features vs AUC for SVM and logistic selector



Alpha Values vs AUC for SVM and lasso selector



Number of Features vs AUC for SVM and rf selector



svm

Per rf

num\_features: 28  
pr\_auc: 0.6500812318994138  
best\_precision: 0.6923076923076923  
best\_recall: 0.8181818181818182  
roc\_auc: 0.6883116883116884  
f1: 0.75  
accuracy: 0.76  
confusion\_matrix: [[10 4]  
[ 2 9]]  
best\_threshold: 0.439

Per logistic

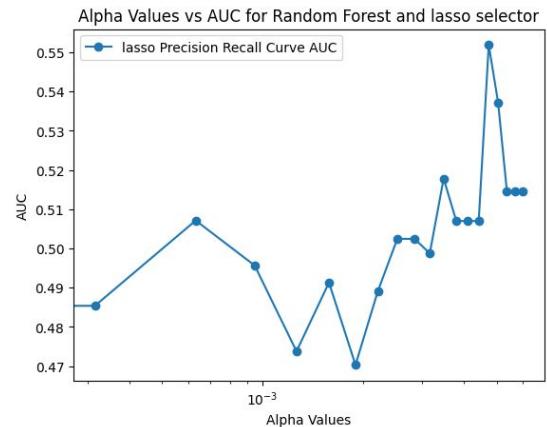
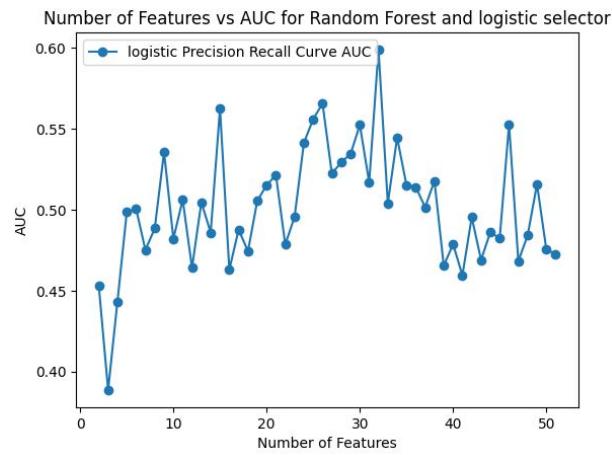
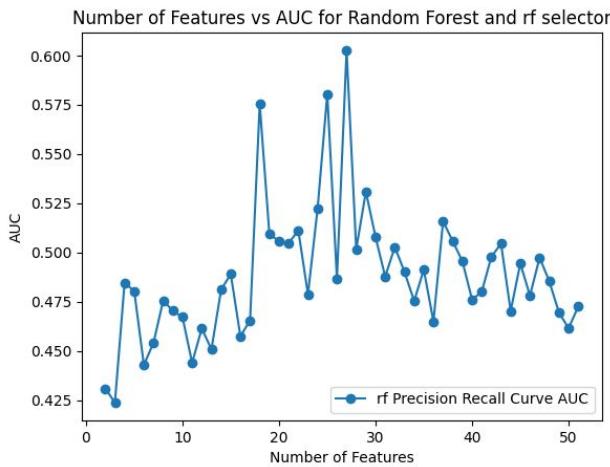
num\_features: 2  
pr\_auc: 0.4795049506736814  
best\_precision: 0.5789473684210527  
best\_recall: 1.0  
roc\_auc: 0.5714285714285714  
f1: 0.7333333333333333  
accuracy: 0.68  
confusion\_matrix: [[ 6 8]  
[ 0 11]]  
best\_threshold: 0.4700000000000003

Per lasso

alpha: 0.003473684210526316  
pr\_auc: 0.6859890109890109  
best\_precision: 0.6666666666666666  
best\_recall: 0.9090909090909091  
roc\_auc: 0.7532467532467532  
f1: 0.7692307692307693  
accuracy: 0.76  
confusion\_matrix: [[ 9 5]  
[ 1 10]]  
best\_threshold: 0.464

# 64 features

randomstate = 74.  
threshold variabile e predizioni con mean,  
no Smote



# Random Forest

Per rf

```

num_features: 27
pr_auc: 0.6025946275946277
best_precision: 0.6
best_recall: 0.8181818181818182
roc_auc: 0.6688311688311688
f1: 0.6923076923076923
accuracy: 0.68
confusion_matrix: [[8 6]
[2 9]]
best_threshold: 0.419

```

Per logistic

```

num_features: 24
pr_auc: 0.541389418662146
best_precision: 0.625
best_recall: 0.9090909090909091
roc_auc: 0.6428571428571428
f1: 0.7407407407407407
accuracy: 0.72
confusion_matrix: [[ 8   6]
[ 1 10]]
best_threshold: 0.398

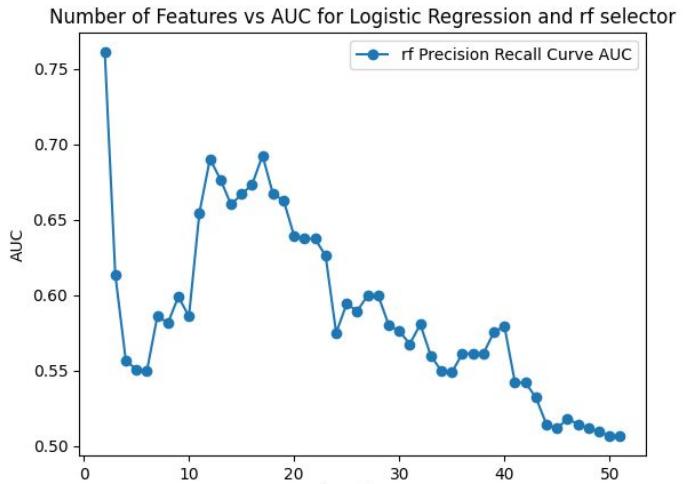
```

Per lasso

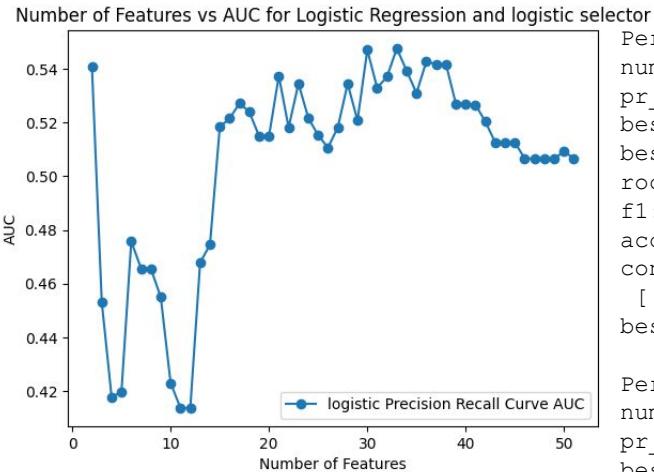
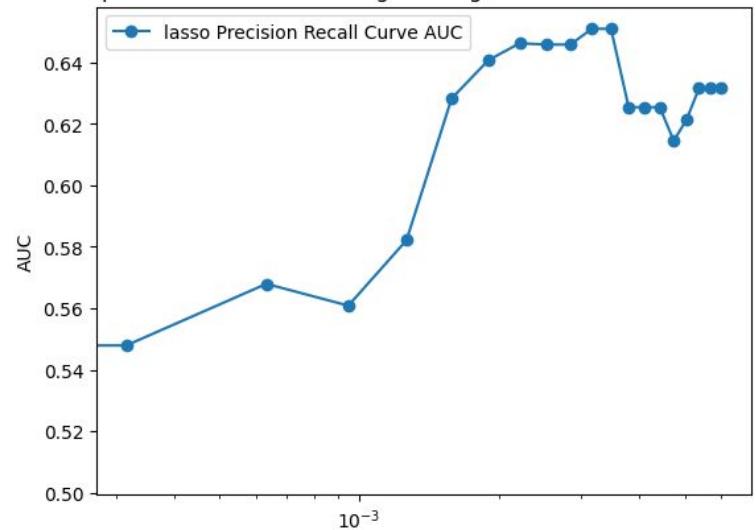
```

alpha: 0.004736842105263158
pr_auc: 0.5518396042460214
best_precision: 0.6470588235294118
best_recall: 1.0
roc_auc: 0.7012987012987013
f1: 0.7857142857142857
accuracy: 0.76
confusion_matrix: [[ 8   6]
[ 0 11]]
best_threshold: 0.424

```

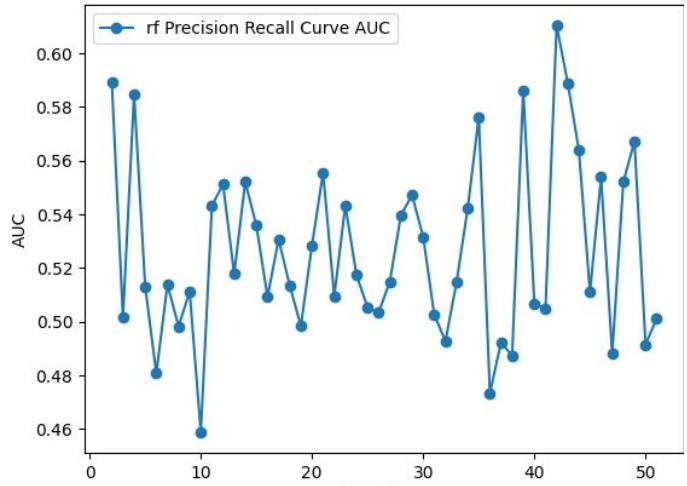


## Alpha Values vs AUC for Logistic Regression and lasso selector

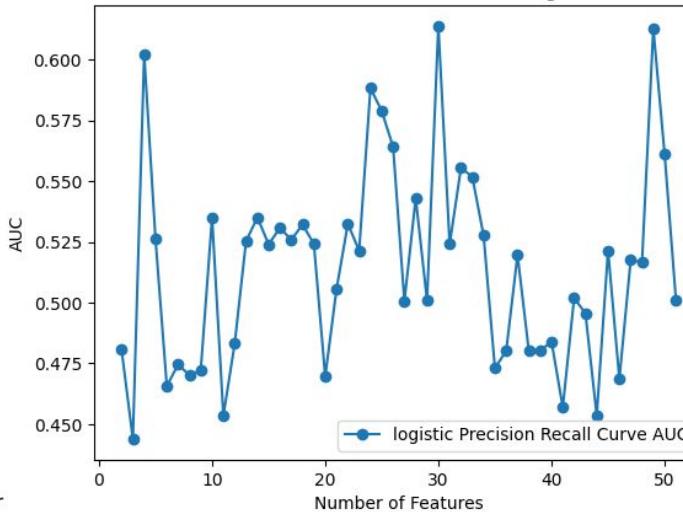


# logistic (male)

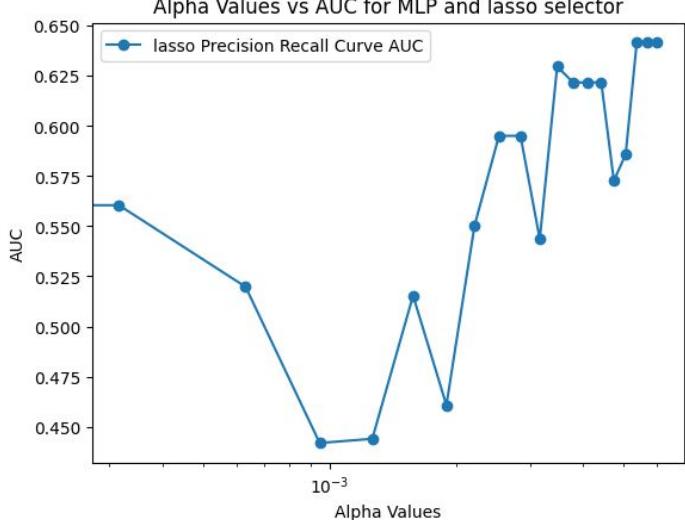
Number of Features vs AUC for MLP and rf selector



Number of Features vs AUC for MLP and logistic selector



MLP



## Per rf

```

num_features: 29
pr_auc: 0.547098396021841
best_precision: 0.6923076923076923
best_recall: 0.8181818181818182
roc_auc: 0.6818181818181818
f1: 0.75
accuracy: 0.76
confusion_matrix: [[10  4]
                   [ 2  9]]
best_threshold: 0.446

```

## Per logistic

```

num_features: 26
pr_auc: 0.5640869157580387
best_precision: 0.5882352941176471
best_recall: 0.9090909090909091
roc_auc: 0.6818181818181819
f1: 0.7142857142857143
accuracy: 0.68
confusion_matrix: [[ 7  7]
                   [ 1 10]]
best_threshold: 0.291

```

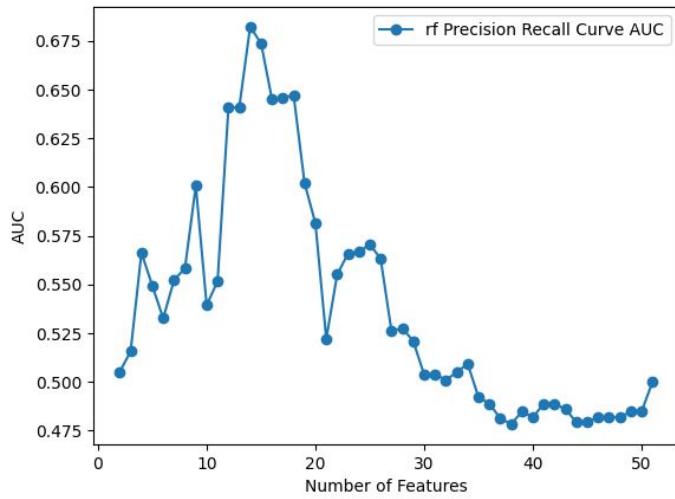
## Per lasso

```

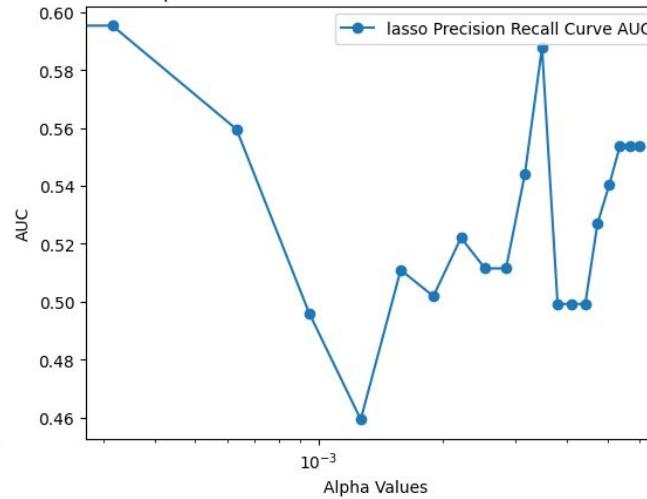
alpha: 0.0037894736842105266
pr_auc: 0.6216668358379588
best_precision: 0.6923076923076923
best_recall: 0.8181818181818182
roc_auc: 0.7402597402597403
f1: 0.75
accuracy: 0.76
confusion_matrix: [[10  4]
                   [ 2  9]]
best_threshold: 0.41600000000000004

```

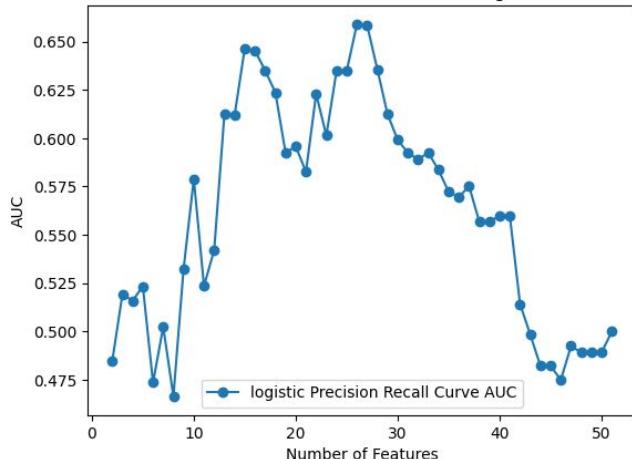
Number of Features vs AUC for SVM and rf selector



Alpha Values vs AUC for SVM and lasso selector



Number of Features vs AUC for SVM and logistic selector



svm

Per rf

```
num_features: 4
pr_auc: 0.5662673111202523
best_precision: 0.6111111111111112
best_recall: 1.0
roc_auc: 0.6558441558441559
f1: 0.7586206896551724
accuracy: 0.72
confusion_matrix: [[ 7  7]
                   [ 0 11]]
best_threshold: 0.359
```

Per logistic

```
num_features: 27
pr_auc: 0.6584149370034538
best_precision: 0.625
best_recall: 0.9090909090909091
roc_auc: 0.7012987012987013
f1: 0.7407407407407407
accuracy: 0.72
confusion_matrix: [[ 8  6]
                   [ 1 10]]
best_threshold: 0.381
```

Per lasso

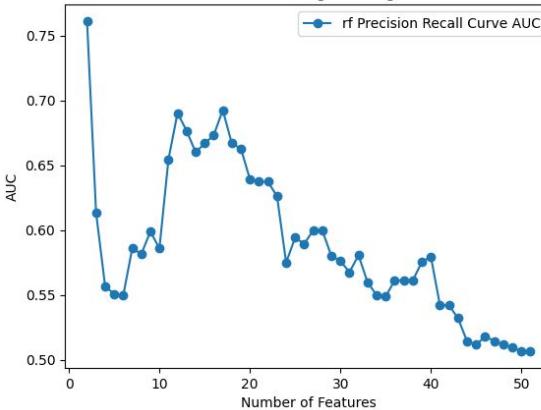
```
alpha: 0.00031578947368421053
pr_auc: 0.5953280239165407
best_precision: 0.625
best_recall: 0.9090909090909091
roc_auc: 0.6753246753246753
f1: 0.7407407407407407
accuracy: 0.72
confusion_matrix: [[ 8  6]
                   [ 1 10]]
best_threshold: 0.354
```

# 64 features

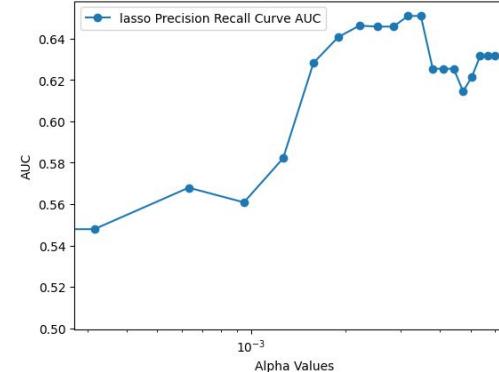
randomstate = 74.  
threshold fissa 0.5 e majority  
voting,  
no Smote

MALISSIMO

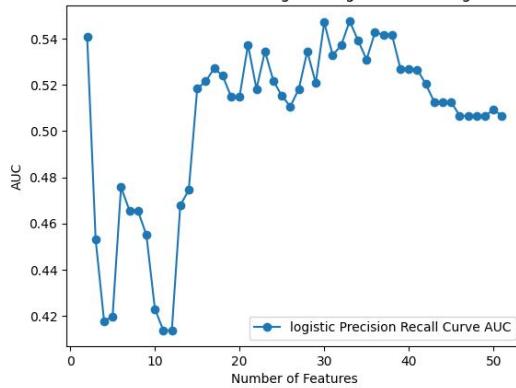
Number of Features vs AUC for Logistic Regression and rf selector



Alpha Values vs AUC for Logistic Regression and lasso selector



Number of Features vs AUC for Logistic Regression and logistic selector



# Logistic malissimo

Per rf

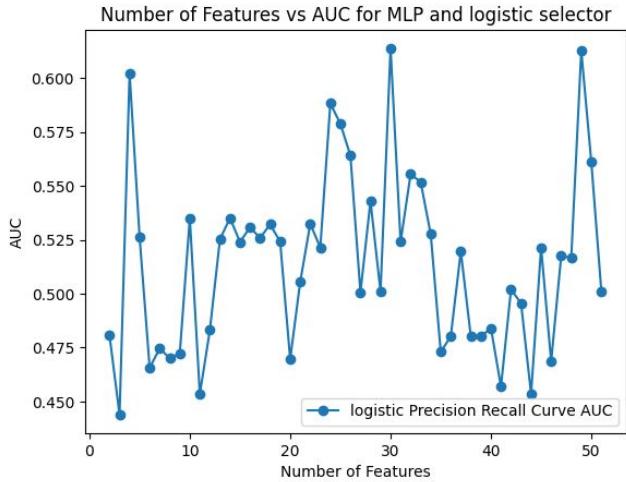
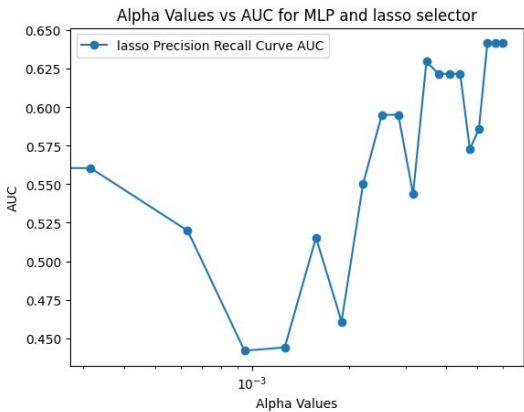
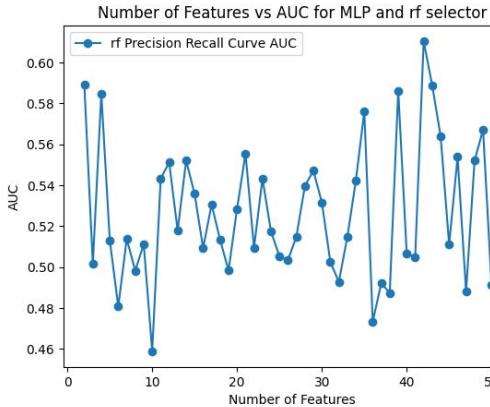
```
num_features: 23
pr_auc: 0.6259248327430145
best_precision: 0.75
best_recall: 0.2727272727272727
roc_auc: 0.7272727272727272
f1: 0.4
accuracy: 0.64
confusion_matrix: [[13 1]
 [ 8 3]]
best_threshold: 0.5
```

Per logistic

```
num_features: 30
pr_auc: 0.547007411780139
best_precision: 0.5
best_recall: 0.1818181818181818
roc_auc: 0.6428571428571428
f1: 0.26666666666666666666
accuracy: 0.56
confusion_matrix: [[12 2]
 [ 9 2]]
best_threshold: 0.5
```

Per lasso

```
alpha: 0.003157894736842105
pr_auc: 0.6509018759018759
best_precision: 0.5
best_recall: 0.1818181818181818
roc_auc: 0.7662337662337662
f1: 0.26666666666666666666
accuracy: 0.56
confusion_matrix: [[12 2]
```



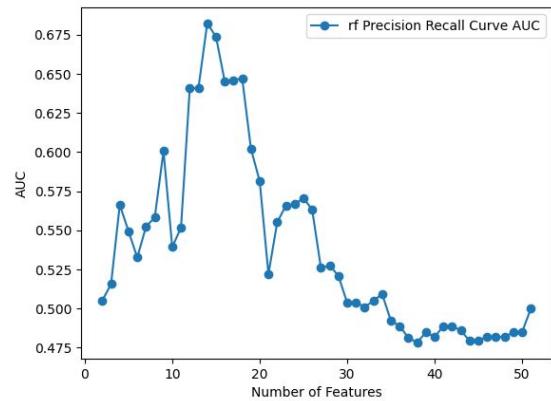
# MLP

Per rf  
num\_features: 29  
pr\_auc: 0.547098396021841  
best\_precision: 0.6428571428571429  
best\_recall: 0.8181818181818182  
roc\_auc: 0.6818181818181818  
f1: 0.72  
accuracy: 0.72  
confusion\_matrix: [[9 5]  
[2 9]]  
best\_threshold: 0.5

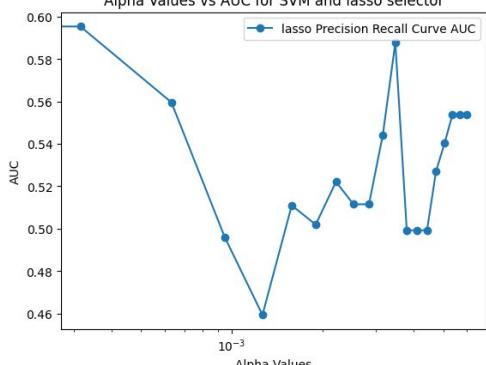
Per logistic  
num\_features: 28  
pr\_auc: 0.5429342122523941  
best\_precision: 0.6153846153846154  
best\_recall: 0.7272727272727273  
roc\_auc: 0.6688311688311689  
f1: 0.6666666666666666  
accuracy: 0.68  
confusion\_matrix: [[9 5]  
[3 8]]  
best\_threshold: 0.5

Per lasso  
alpha: 0.00031578947368421053  
pr\_auc: 0.5604517093751544  
best\_precision: 0.6  
best\_recall: 0.5454545454545454  
roc\_auc: 0.6623376623376623  
f1: 0.5714285714285714  
accuracy: 0.64  
confusion\_matrix: [[10 4]  
[5 6]]  
best\_threshold: 0.5

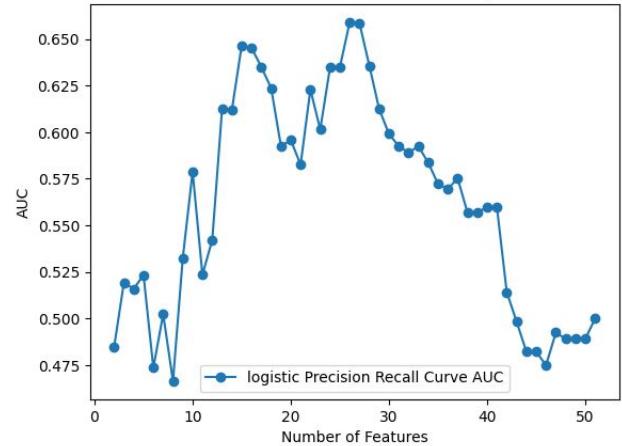
Number of Features vs AUC for SVM and rf selector



Alpha Values vs AUC for SVM and lasso selector



Number of Features vs AUC for SVM and logistic selector



svm

Per rf

```
num_features: 14
pr_auc: 0.6821967107852275
best_precision: 0.5555555555555556
best_recall: 0.45454545454545453
roc_auc: 0.7077922077922079
f1: 0.5
accuracy: 0.6
confusion_matrix: [[10  4]
 [ 6  5]]
best_threshold: 0.5
```

Per logistic

```
num_features: 24
pr_auc: 0.6348087444344129
best_precision: 0.5
best_recall: 0.45454545454545453
roc_auc: 0.6753246753246753
f1: 0.47619047619047616
accuracy: 0.56
confusion_matrix: [[9  5]
 [ 6  5]]
best_threshold: 0.5
```

Per lasso

```
alpha: 0.0022105263157894735
pr_auc: 0.5221047473650907
best_precision: 0.5555555555555556
best_recall: 0.45454545454545453
roc_auc: 0.5974025974025974
f1: 0.5
accuracy: 0.6
confusion_matrix: [[10  4]
 [ 6  5]]
best_threshold: 0.5
```

Per rf

num\_features: 20

pr\_auc: 0.5056551635499005

best\_precision: 0.6666666666666666

best\_recall: 0.3636363636363636

roc\_auc: 0.5714285714285714

f1: 0.47058823529411764

accuracy: 0.64

confusion\_matrix: [[12 2]

[ 7 4]]

best\_threshold: 0.5

Per logistic

num\_features: 9

pr\_auc: 0.5356371300151204

best\_precision: 0.625

best\_recall: 0.4545454545454545

roc\_auc: 0.6168831168831168

f1: 0.5263157894736842

accuracy: 0.64

confusion\_matrix: [[11 3]

[ 6 5]]

best\_threshold: 0.5

Per lasso

alpha: 0.0

pr\_auc: 0.47251082251082255

best\_precision: 0.5714285714285714

best\_recall: 0.3636363636363636

roc\_auc: 0.551948051948052

f1: 0.4444444444444444

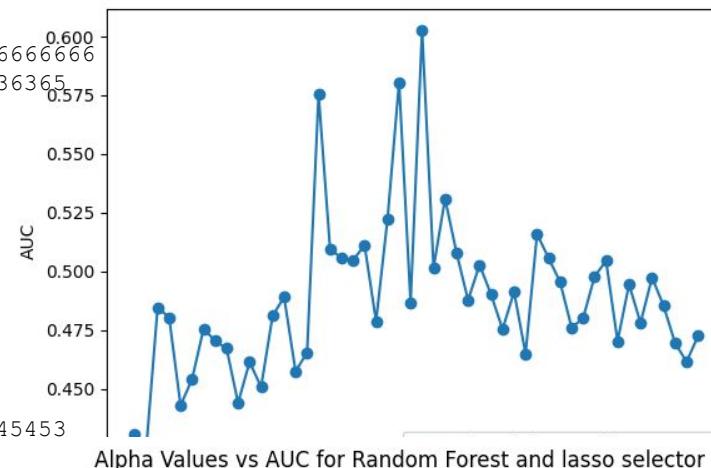
accuracy: 0.6

confusion\_matrix: [[11 3]

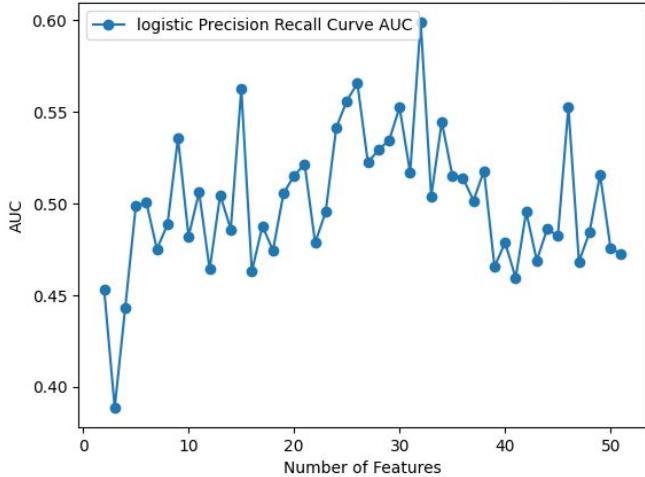
[ 7 4]]

best\_threshold: 0.5

Number of Features vs AUC for Random Forest and rf selector



Number of Features vs AUC for Random Forest and logistic selector



RandomForest