Choice: 1 = purchase
0 = no purchase

```r
table(BBBC_Test$Choice)
```

```
   0    1
2096  204
```

	Campaign market	Campaign Response Rate	Purchased	Model Response Rate	Total mailers	Mailing cost (0.65)	Book cost ($15)	Overhead (45% of cost)
No model	50,000	9.03%	4,515	-	50,000	32,500.00	67,725.00	30,476.25
RBF_SVM	50,000	9.03%	4,515	15.39%	7,696	5,002.17	67,725.00	30,476.25
Linear SVM	50,000	9.03%	4,515	17.39%	8,696	5,652.17	67,725.00	30,476.25
Poly SVM	50,000	9.03%	2,624	6.00%	3,000	1,950.00	39,355.43	17,709.95
Log Reg	50,000	9.03%	2,928	8.87%	4,435	2,882.61	43,920.65	19,764.29

	Total Expenses	Total Sales (31.95/book)	Margin (Profit)	
No model	130,701.25	144,254.25	13,553.00	
RBF_SVM	103,203.42	144,254.25	41,050.83	3.028910654
Linear SVM	103,853.42	144,254.25	40,400.83	2.980950792
Poly SVM	59,015.38	83,827.08	24,811.70	1.830716126
Log Reg	66,567.55	93,550.99	26,983.43	1.990956599

RBF_SVM		
	204	Purchased from test data set (actual # of customers that did purchase)
	2096	Did not purchase from test data set (actual # of customers that did not purchase)
	150	False positive from test data set (overpredicted, predicted did purchase when actually did not)
	0	False negative from test data set (under predicted, predicted did not purchase when they actually did)
	204	True positive from test data set (got right)
	1946	True negative from test dat set (got right)
	2300	Total observations
	93.48%	Accuracty rate
	6.52%	Error rate

Lin_SVM	204	Purchased from test data set (actual # of customers that did purchase)
	2096	Did not purchase from test data set (actual # of customers that did not purchase)
	196	False positive from test data set (overpredicted, predicted did purchase when actually did not)
	0	False negative from test data set (under predicted, predicted did not purchase when they actually did)
	204	True positive from test data set (got right)
	1900	True negative from test dat set (got right)
	2300	Total observations
	91.48%	Accuracty rate
	8.52%	Error rate
Poly_SVM	204	Purchased from test data set (actual # of customers that did purchase)
	2096	Did not purchase from test data set (actual # of customers that did not purchase)
	21	False positive from test data set (overpredicted, predicted did purchase when actually did not)
	87	False negative from test data set (under predicted, predicted did not purchase when they actually did)
	117	True positive from test data set (got right)
	2075	True negative from test dat set (got right)
	2300	Total observations
	95.30%	Accuracty rate
	4.70%	Error rate
Log_Reg	204	Purchased from test data set (actual # of customers that did purchase)
	2096	Did not purchase from test data set (actual # of customers that did not purchase)
	145	False positive from test data set (overpredicted, predicted did purchase when actually did not)
	73	False negative from test data set (under predicted, predicted did not purchase when they actually did)
	59	True positive from test data set (got right)
	2023	True negative from test dat set (got right)
	2300	Total observations
	90.52%	Accuracty rate
	9.48%	Error rate

Type	RBF	Linear	Poly	Log Reg
True Positive	8.87%	8.87%	5.09%	2.57%
False Positive	6.52%	8.52%	0.91%	6.30%
True Negative	84.61%	82.61%	90.22%	87.96%
False Negative	0.00%	0.00%	3.78%	3.17%

Dataset	Purchase	Not Purchase	Total	Response Rate
Test	204	2096	2300	8.87%
East campaign	1806	18194	20000	9.03%

	RBF	Linear	Poly	Log Reg
Total observati	2300	2300	2300	2300
Predicted purcl	204	204	117	59
Over predicted	150	196	21	145
Under predict	0	0	87	73
Total to mail	354	400	138	204
Model respons	15.39%	17.39%	6.00%	8.87%

	Lost Sales	Lost sales rate	Lost customers
Poly	87 out of 2300	3.78%	87
Log Reg	73 out of 2300	3.17%	73

Note: RBF and Linear predicted for all customers that purchased in the test data set,
both models overfit the data. Polynomial underfit the data, 87 false negative were predicted, that means
87 customers that did purchase the book were labeled as not purchasing the book. These
customers would be left out of the mailing list and lead to potential lost sales.
Logit underfit the data, 73 false negatives, 73 customers that did purchase the book
but were labeled as not purchasing the book. These customers would be left out of the mailing

RBF_SVM

```
Confusion Matrix and Statistics

          Reference
Prediction    0    1
         0 1946  150
         1    0  204

               Accuracy : 0.9348
                 95% CI : (0.9239, 0.9445)
    No Information Rate : 0.8461
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.6971

 Mcnemar's Test P-Value : < 2.2e-16

            Sensitivity : 1.0000
            Specificity : 0.5763
         Pos Pred Value : 0.9284
         Neg Pred Value : 1.0000
             Prevalence : 0.8461
         Detection Rate : 0.8461
   Detection Prevalence : 0.9113
      Balanced Accuracy : 0.7881

       'Positive' Class : 0
```

Lin_SVM

```
Confusion Matrix and Statistics

          Reference
Prediction    0    1
         0 1900  196
         1    0  204

               Accuracy : 0.9148
                 95% CI : (0.9026, 0.9259)
    No Information Rate : 0.8261
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.6323

 Mcnemar's Test P-Value : < 2.2e-16

            Sensitivity : 1.0000
            Specificity : 0.5100
         Pos Pred Value : 0.9065
         Neg Pred Value : 1.0000
             Prevalence : 0.8261
         Detection Rate : 0.8261
   Detection Prevalence : 0.9113
      Balanced Accuracy : 0.7550

       'Positive' Class : 0
```

Poly_SVM

```
Confusion Matrix and Statistics

          Reference
Prediction    0    1
         0 2075   21
         1   87  117

               Accuracy : 0.953
                 95% CI : (0.9436, 0.9613)
    No Information Rate : 0.94
    P-Value [Acc > NIR] : 0.003771

                  Kappa : 0.6599

 Mcnemar's Test P-Value : 3.985e-10

            Sensitivity : 0.9598
            Specificity : 0.8478
         Pos Pred Value : 0.9900
         Neg Pred Value : 0.5735
             Prevalence : 0.9400
         Detection Rate : 0.9022
   Detection Prevalence : 0.9113
      Balanced Accuracy : 0.9038

       'Positive' Class : 0
```

Logit

```
# Confusion Matrix and Statistics
#
#           Reference
# Prediction    0    1
#          0 2023  145
#          1   73   59
#
#                Accuracy : 0.9052
#                  95% CI : (0.8925, 0.9169)
#     No Information Rate : 0.9113
#     P-Value [Acc > NIR] : 0.856
#
#                   Kappa : 0.3026
#
#  Mcnemar's Test P-Value : 1.519e-06
#
#             Sensitivity : 0.28922
#             Specificity : 0.96517
#          Pos Pred Value : 0.44697
#          Neg Pred Value : 0.93312
#              Prevalence : 0.08870
#          Detection Rate : 0.02565
#    Detection Prevalence : 0.05739
#       Balanced Accuracy : 0.62719
#
#        'Positive' Class : 1
#
```