

HW1

Question 2.1

Describe a situation or problem from your job, everyday life, current events, etc., for which a classification model is appropriate.

OUR ANSWER

Problem: Recommend products to users based on their purchase history and browsing history.

Classification Model: KNN

Predictors:

I. Categories: Identify customer preferences using their purchase and browsing histories, ensuring

II. View History: Track products that capture user attention for potential future purchases.

III. Shopping Cart: Items in the cart highlight the user's primary product interests and purchase intent.

IV. Purchase History: Reveals the specific products previously bought by the customer.

V. Customer Reviews: Use user ratings to filter out products that don't meet their satisfaction.

Operation:

#• Build a customer dataset with the predictors above.

#• Filter out products and categories not favored by the target customers, based on user ratings and reviews.

#• Identify users with similar tastes in categories and purchased products.

#• Recommend products purchased by similar users and products of interest to target customers.

Packages and Import Data

```
library("kernlab")
library("knnn")
print("Packages Imported")
```

```
## [1] "Packages Imported"
```

```
# import the "credit_card_data.txt" file in
data <- read.table("credit_card_data.txt")
print(data)
```

| ## | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 |
|------|----|-------|--------|-------|----|----|----|----|-----|-------|-----|
| ## 1 | 1 | 30.83 | 0.000 | 1.250 | 1 | 0 | 1 | 1 | 202 | 0 | 1 |
| ## 2 | 0 | 58.67 | 4.460 | 3.040 | 1 | 0 | 6 | 1 | 43 | 560 | 1 |
| ## 3 | 0 | 24.50 | 0.500 | 1.500 | 1 | 1 | 0 | 1 | 280 | 824 | 1 |
| ## 4 | 1 | 27.83 | 1.540 | 3.750 | 1 | 0 | 5 | 0 | 100 | 3 | 1 |
| ## 5 | 1 | 20.17 | 5.625 | 1.710 | 1 | 1 | 0 | 1 | 120 | 0 | 1 |
| ## 6 | 1 | 32.08 | 4.000 | 2.500 | 1 | 1 | 0 | 0 | 360 | 0 | 1 |
| ## 7 | 1 | 33.17 | 1.040 | 6.500 | 1 | 1 | 0 | 0 | 164 | 31285 | 1 |
| ## 8 | 0 | 22.92 | 11.585 | 0.040 | 1 | 1 | 0 | 1 | 80 | 1349 | 1 |
| ## 9 | 1 | 54.42 | 0.500 | 3.960 | 1 | 1 | 0 | 1 | 180 | 314 | 1 |

| | | | | | | | | | | | |
|-------|---|-------|--------|--------|---|---|----|---|-----|-------|---|
| ## 10 | 1 | 42.50 | 4.915 | 3.165 | 1 | 1 | 0 | 0 | 52 | 1442 | 1 |
| ## 11 | 1 | 22.08 | 0.830 | 2.165 | 0 | 1 | 0 | 0 | 128 | 0 | 1 |
| ## 12 | 1 | 29.92 | 1.835 | 4.335 | 1 | 1 | 0 | 1 | 260 | 200 | 1 |
| ## 13 | 0 | 38.25 | 6.000 | 1.000 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## 14 | 1 | 48.08 | 6.040 | 0.040 | 0 | 1 | 0 | 1 | 0 | 2690 | 1 |
| ## 15 | 0 | 45.83 | 10.500 | 5.000 | 1 | 0 | 7 | 0 | 0 | 0 | 1 |
| ## 16 | 1 | 36.67 | 4.415 | 0.250 | 1 | 0 | 10 | 0 | 320 | 0 | 1 |
| ## 17 | 1 | 28.25 | 0.875 | 0.960 | 1 | 0 | 3 | 0 | 396 | 0 | 1 |
| ## 18 | 0 | 23.25 | 5.875 | 3.170 | 1 | 0 | 10 | 1 | 120 | 245 | 1 |
| ## 19 | 1 | 21.83 | 0.250 | 0.665 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## 20 | 0 | 19.17 | 8.585 | 0.750 | 1 | 0 | 7 | 1 | 96 | 0 | 1 |
| ## 21 | 1 | 25.00 | 11.250 | 2.500 | 1 | 0 | 17 | 1 | 200 | 1208 | 1 |
| ## 22 | 1 | 23.25 | 1.000 | 0.835 | 1 | 1 | 0 | 1 | 300 | 0 | 1 |
| ## 23 | 0 | 47.75 | 8.000 | 7.875 | 1 | 0 | 6 | 0 | 0 | 1260 | 1 |
| ## 24 | 0 | 27.42 | 14.500 | 3.085 | 1 | 0 | 1 | 1 | 120 | 11 | 1 |
| ## 25 | 0 | 41.17 | 6.500 | 0.500 | 1 | 0 | 3 | 0 | 145 | 0 | 1 |
| ## 26 | 0 | 15.83 | 0.585 | 1.500 | 1 | 0 | 2 | 1 | 100 | 0 | 1 |
| ## 27 | 0 | 47.00 | 13.000 | 5.165 | 1 | 0 | 9 | 0 | 0 | 0 | 1 |
| ## 28 | 1 | 56.58 | 18.500 | 15.000 | 1 | 0 | 17 | 0 | 0 | 0 | 1 |
| ## 29 | 1 | 57.42 | 8.500 | 7.000 | 1 | 0 | 3 | 1 | 0 | 0 | 1 |
| ## 30 | 1 | 42.08 | 1.040 | 5.000 | 1 | 0 | 6 | 0 | 500 | 10000 | 1 |
| ## 31 | 1 | 29.25 | 14.790 | 5.040 | 1 | 0 | 5 | 0 | 168 | 0 | 1 |
| ## 32 | 1 | 42.00 | 9.790 | 7.960 | 1 | 0 | 8 | 1 | 0 | 0 | 1 |
| ## 33 | 1 | 49.50 | 7.585 | 7.585 | 1 | 0 | 15 | 0 | 0 | 5000 | 1 |
| ## 34 | 0 | 36.75 | 5.125 | 5.000 | 1 | 1 | 0 | 0 | 0 | 4000 | 1 |
| ## 35 | 0 | 22.58 | 10.750 | 0.415 | 1 | 0 | 5 | 0 | 0 | 560 | 1 |
| ## 36 | 1 | 27.83 | 1.500 | 2.000 | 1 | 0 | 11 | 0 | 434 | 35 | 1 |
| ## 37 | 1 | 27.25 | 1.585 | 1.835 | 1 | 0 | 12 | 0 | 583 | 713 | 1 |
| ## 38 | 0 | 23.00 | 11.750 | 0.500 | 1 | 0 | 2 | 0 | 300 | 551 | 1 |
| ## 39 | 1 | 27.75 | 0.585 | 0.250 | 1 | 0 | 2 | 1 | 260 | 500 | 1 |
| ## 40 | 1 | 54.58 | 9.415 | 14.415 | 1 | 0 | 11 | 0 | 30 | 300 | 1 |
| ## 41 | 1 | 34.17 | 9.170 | 4.500 | 1 | 0 | 12 | 0 | 0 | 221 | 1 |
| ## 42 | 1 | 28.92 | 15.000 | 5.335 | 1 | 0 | 11 | 1 | 0 | 2283 | 1 |
| ## 43 | 1 | 29.67 | 1.415 | 0.750 | 1 | 0 | 1 | 1 | 240 | 100 | 1 |
| ## 44 | 1 | 39.58 | 13.915 | 8.625 | 1 | 0 | 6 | 0 | 70 | 0 | 1 |
| ## 45 | 1 | 56.42 | 28.000 | 28.500 | 1 | 0 | 40 | 1 | 0 | 15 | 1 |
| ## 46 | 1 | 54.33 | 6.750 | 2.625 | 1 | 0 | 11 | 0 | 0 | 284 | 1 |
| ## 47 | 0 | 41.00 | 2.040 | 0.125 | 1 | 0 | 23 | 0 | 455 | 1236 | 1 |
| ## 48 | 1 | 31.92 | 4.460 | 6.040 | 1 | 0 | 3 | 1 | 311 | 300 | 1 |
| ## 49 | 1 | 41.50 | 1.540 | 3.500 | 0 | 1 | 0 | 1 | 216 | 0 | 1 |
| ## 50 | 1 | 23.92 | 0.665 | 0.165 | 0 | 1 | 0 | 1 | 100 | 0 | 1 |
| ## 51 | 0 | 25.75 | 0.500 | 0.875 | 1 | 1 | 0 | 0 | 491 | 0 | 1 |
| ## 52 | 1 | 26.00 | 1.000 | 1.750 | 1 | 1 | 0 | 0 | 280 | 0 | 1 |
| ## 53 | 1 | 37.42 | 2.040 | 0.040 | 1 | 1 | 0 | 0 | 400 | 5800 | 1 |
| ## 54 | 1 | 34.92 | 2.500 | 0.000 | 1 | 1 | 0 | 0 | 239 | 200 | 1 |
| ## 55 | 1 | 34.25 | 3.000 | 7.415 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## 56 | 1 | 23.33 | 11.625 | 0.835 | 1 | 1 | 0 | 0 | 160 | 300 | 1 |
| ## 57 | 1 | 23.17 | 0.000 | 0.085 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## 58 | 1 | 44.33 | 0.500 | 5.000 | 1 | 1 | 0 | 0 | 320 | 0 | 1 |
| ## 59 | 1 | 35.17 | 4.500 | 5.750 | 0 | 1 | 0 | 0 | 711 | 0 | 1 |
| ## 60 | 1 | 43.25 | 3.000 | 6.000 | 1 | 0 | 11 | 1 | 80 | 0 | 1 |
| ## 61 | 1 | 56.75 | 12.250 | 1.250 | 1 | 0 | 4 | 0 | 200 | 0 | 1 |
| ## 62 | 1 | 31.67 | 16.165 | 3.000 | 1 | 0 | 9 | 1 | 250 | 730 | 1 |
| ## 63 | 0 | 23.42 | 0.790 | 1.500 | 1 | 0 | 2 | 0 | 80 | 400 | 1 |

| | | | | | | | | | | | |
|--------|---|-------|--------|--------|---|---|----|---|-----|-------|---|
| ## 64 | 0 | 20.42 | 0.835 | 1.585 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| ## 65 | 1 | 26.67 | 4.250 | 4.290 | 1 | 0 | 1 | 0 | 120 | 0 | 1 |
| ## 66 | 1 | 34.17 | 1.540 | 1.540 | 1 | 0 | 1 | 0 | 520 | 50000 | 1 |
| ## 67 | 0 | 36.00 | 1.000 | 2.000 | 1 | 0 | 11 | 1 | 0 | 456 | 1 |
| ## 68 | 1 | 25.50 | 0.375 | 0.250 | 1 | 0 | 3 | 1 | 260 | 15108 | 1 |
| ## 69 | 1 | 19.42 | 6.500 | 1.460 | 1 | 0 | 7 | 1 | 80 | 2954 | 1 |
| ## 70 | 1 | 35.17 | 25.125 | 1.625 | 1 | 0 | 1 | 0 | 515 | 500 | 1 |
| ## 71 | 1 | 32.33 | 7.500 | 1.585 | 1 | 1 | 0 | 0 | 420 | 0 | 0 |
| ## 72 | 0 | 38.58 | 5.000 | 13.500 | 1 | 1 | 0 | 0 | 980 | 0 | 0 |
| ## 73 | 1 | 44.25 | 0.500 | 10.750 | 1 | 1 | 0 | 1 | 400 | 0 | 0 |
| ## 74 | 1 | 44.83 | 7.000 | 1.625 | 0 | 1 | 0 | 1 | 160 | 2 | 0 |
| ## 75 | 1 | 20.67 | 5.290 | 0.375 | 1 | 0 | 1 | 1 | 160 | 0 | 0 |
| ## 76 | 1 | 34.08 | 6.500 | 0.125 | 1 | 1 | 0 | 0 | 443 | 0 | 0 |
| ## 77 | 0 | 19.17 | 0.585 | 0.585 | 1 | 1 | 0 | 0 | 160 | 0 | 0 |
| ## 78 | 1 | 21.67 | 1.165 | 2.500 | 1 | 0 | 1 | 1 | 180 | 20 | 0 |
| ## 79 | 1 | 21.50 | 9.750 | 0.250 | 1 | 1 | 0 | 1 | 140 | 0 | 0 |
| ## 80 | 1 | 49.58 | 19.000 | 0.000 | 1 | 0 | 1 | 1 | 94 | 0 | 0 |
| ## 81 | 0 | 27.67 | 1.500 | 2.000 | 1 | 1 | 0 | 1 | 368 | 0 | 0 |
| ## 82 | 1 | 39.83 | 0.500 | 0.250 | 1 | 1 | 0 | 1 | 288 | 0 | 0 |
| ## 83 | 1 | 27.25 | 0.625 | 0.455 | 1 | 1 | 0 | 0 | 200 | 0 | 0 |
| ## 84 | 1 | 37.17 | 4.000 | 5.000 | 1 | 1 | 0 | 0 | 280 | 0 | 0 |
| ## 85 | 1 | 25.67 | 2.210 | 4.000 | 1 | 1 | 0 | 1 | 188 | 0 | 0 |
| ## 86 | 1 | 34.00 | 4.500 | 1.000 | 1 | 1 | 0 | 0 | 240 | 0 | 0 |
| ## 87 | 0 | 49.00 | 1.500 | 0.000 | 1 | 1 | 0 | 0 | 100 | 27 | 0 |
| ## 88 | 1 | 62.50 | 12.750 | 5.000 | 1 | 1 | 0 | 1 | 112 | 0 | 0 |
| ## 89 | 1 | 31.42 | 15.500 | 0.500 | 1 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## 90 | 1 | 52.33 | 1.375 | 9.460 | 1 | 1 | 0 | 0 | 200 | 100 | 0 |
| ## 91 | 1 | 28.75 | 1.500 | 1.500 | 1 | 1 | 0 | 0 | 0 | 225 | 0 |
| ## 92 | 0 | 28.58 | 3.540 | 0.500 | 1 | 1 | 0 | 0 | 171 | 0 | 0 |
| ## 93 | 1 | 23.00 | 0.625 | 0.125 | 1 | 1 | 0 | 1 | 180 | 1 | 0 |
| ## 94 | 0 | 22.50 | 11.000 | 3.000 | 1 | 1 | 0 | 0 | 268 | 0 | 0 |
| ## 95 | 0 | 28.50 | 1.000 | 1.000 | 1 | 0 | 2 | 0 | 167 | 500 | 0 |
| ## 96 | 1 | 37.50 | 1.750 | 0.250 | 1 | 1 | 0 | 0 | 164 | 400 | 0 |
| ## 97 | 1 | 35.25 | 16.500 | 4.000 | 1 | 1 | 0 | 1 | 80 | 0 | 0 |
| ## 98 | 1 | 18.67 | 5.000 | 0.375 | 1 | 0 | 2 | 1 | 0 | 38 | 0 |
| ## 99 | 1 | 25.00 | 12.000 | 2.250 | 1 | 0 | 2 | 0 | 120 | 5 | 0 |
| ## 100 | 1 | 27.83 | 4.000 | 5.750 | 1 | 0 | 2 | 0 | 75 | 0 | 0 |
| ## 101 | 1 | 54.83 | 15.500 | 0.000 | 1 | 0 | 20 | 1 | 152 | 130 | 0 |
| ## 102 | 1 | 28.75 | 1.165 | 0.500 | 1 | 1 | 0 | 1 | 280 | 0 | 0 |
| ## 103 | 0 | 25.00 | 11.000 | 4.500 | 1 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## 104 | 1 | 40.92 | 2.250 | 10.000 | 1 | 1 | 0 | 0 | 176 | 0 | 0 |
| ## 105 | 0 | 19.75 | 0.750 | 0.795 | 1 | 0 | 5 | 0 | 140 | 5 | 0 |
| ## 106 | 1 | 29.17 | 3.500 | 3.500 | 1 | 0 | 3 | 0 | 329 | 0 | 0 |
| ## 107 | 0 | 24.50 | 1.040 | 0.500 | 1 | 0 | 3 | 1 | 180 | 147 | 0 |
| ## 108 | 1 | 24.58 | 12.500 | 0.875 | 1 | 1 | 0 | 0 | 260 | 0 | 0 |
| ## 109 | 0 | 33.75 | 0.750 | 1.000 | 1 | 0 | 3 | 0 | 212 | 0 | 0 |
| ## 110 | 1 | 20.67 | 1.250 | 1.375 | 1 | 0 | 3 | 0 | 140 | 210 | 0 |
| ## 111 | 0 | 25.42 | 1.125 | 1.290 | 1 | 0 | 2 | 1 | 200 | 0 | 0 |
| ## 112 | 1 | 37.75 | 7.000 | 11.500 | 1 | 0 | 7 | 0 | 300 | 5 | 0 |
| ## 113 | 1 | 52.50 | 6.500 | 6.290 | 1 | 0 | 15 | 1 | 0 | 11202 | 1 |
| ## 114 | 1 | 57.83 | 7.040 | 14.000 | 1 | 0 | 6 | 0 | 360 | 1332 | 1 |
| ## 115 | 0 | 20.75 | 10.335 | 0.335 | 1 | 0 | 1 | 0 | 80 | 50 | 1 |
| ## 116 | 1 | 39.92 | 6.210 | 0.040 | 1 | 0 | 1 | 1 | 200 | 300 | 1 |
| ## 117 | 1 | 25.67 | 12.500 | 1.210 | 1 | 0 | 67 | 0 | 140 | 258 | 1 |

| | | | | | | | | | | | |
|--------|---|-------|--------|--------|---|---|----|---|-----|-------|---|
| ## 118 | 0 | 24.75 | 12.500 | 1.500 | 1 | 0 | 12 | 0 | 120 | 567 | 1 |
| ## 119 | 0 | 44.17 | 6.665 | 7.375 | 1 | 0 | 3 | 0 | 0 | 0 | 1 |
| ## 120 | 0 | 23.50 | 9.000 | 8.500 | 1 | 0 | 5 | 0 | 120 | 0 | 1 |
| ## 121 | 1 | 34.92 | 5.000 | 7.500 | 1 | 0 | 6 | 0 | 0 | 1000 | 1 |
| ## 122 | 1 | 47.67 | 2.500 | 2.500 | 1 | 0 | 12 | 0 | 410 | 2510 | 1 |
| ## 123 | 1 | 22.75 | 11.000 | 2.500 | 1 | 0 | 7 | 0 | 100 | 809 | 1 |
| ## 124 | 1 | 34.42 | 4.250 | 3.250 | 1 | 0 | 2 | 1 | 274 | 610 | 1 |
| ## 125 | 0 | 28.42 | 3.500 | 0.835 | 1 | 1 | 0 | 1 | 280 | 0 | 1 |
| ## 126 | 1 | 67.75 | 5.500 | 13.000 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| ## 127 | 1 | 20.42 | 1.835 | 2.250 | 1 | 0 | 1 | 1 | 100 | 150 | 1 |
| ## 128 | 0 | 47.42 | 8.000 | 6.500 | 1 | 0 | 6 | 1 | 375 | 51100 | 1 |
| ## 129 | 1 | 36.25 | 5.000 | 2.500 | 1 | 0 | 6 | 1 | 0 | 367 | 1 |
| ## 130 | 1 | 32.67 | 5.500 | 5.500 | 1 | 0 | 12 | 0 | 408 | 1000 | 1 |
| ## 131 | 1 | 48.58 | 6.500 | 6.000 | 1 | 1 | 0 | 0 | 350 | 0 | 1 |
| ## 132 | 1 | 39.92 | 0.540 | 0.500 | 1 | 0 | 3 | 1 | 200 | 1000 | 1 |
| ## 133 | 1 | 33.58 | 2.750 | 4.250 | 1 | 0 | 6 | 1 | 204 | 0 | 1 |
| ## 134 | 0 | 18.83 | 9.500 | 1.625 | 1 | 0 | 6 | 0 | 40 | 600 | 1 |
| ## 135 | 0 | 26.92 | 13.500 | 5.000 | 1 | 0 | 2 | 1 | 0 | 5000 | 1 |
| ## 136 | 0 | 31.25 | 3.750 | 0.625 | 1 | 0 | 9 | 0 | 181 | 0 | 1 |
| ## 137 | 0 | 56.50 | 16.000 | 0.000 | 1 | 0 | 15 | 1 | 0 | 247 | 1 |
| ## 138 | 1 | 43.00 | 0.290 | 1.750 | 1 | 0 | 8 | 1 | 100 | 375 | 1 |
| ## 139 | 1 | 22.33 | 11.000 | 2.000 | 1 | 0 | 1 | 1 | 80 | 278 | 1 |
| ## 140 | 1 | 27.25 | 1.665 | 5.085 | 1 | 0 | 9 | 1 | 399 | 827 | 1 |
| ## 141 | 1 | 32.83 | 2.500 | 2.750 | 1 | 0 | 6 | 1 | 160 | 2072 | 1 |
| ## 142 | 1 | 23.25 | 1.500 | 2.375 | 1 | 0 | 3 | 0 | 0 | 582 | 1 |
| ## 143 | 0 | 40.33 | 7.540 | 8.000 | 1 | 0 | 14 | 1 | 0 | 2300 | 1 |
| ## 144 | 0 | 30.50 | 6.500 | 4.000 | 1 | 0 | 7 | 0 | 0 | 3065 | 1 |
| ## 145 | 0 | 52.83 | 15.000 | 5.500 | 1 | 0 | 14 | 1 | 0 | 2200 | 1 |
| ## 146 | 0 | 46.67 | 0.460 | 0.415 | 1 | 0 | 11 | 0 | 440 | 6 | 1 |
| ## 147 | 0 | 58.33 | 10.000 | 4.000 | 1 | 0 | 14 | 1 | 0 | 1602 | 1 |
| ## 148 | 1 | 37.33 | 6.500 | 4.250 | 1 | 0 | 12 | 0 | 93 | 0 | 1 |
| ## 149 | 1 | 23.08 | 2.500 | 1.085 | 1 | 0 | 11 | 0 | 60 | 2184 | 1 |
| ## 150 | 1 | 32.75 | 1.500 | 5.500 | 1 | 0 | 3 | 0 | 0 | 0 | 1 |
| ## 151 | 0 | 21.67 | 11.500 | 0.000 | 1 | 0 | 11 | 0 | 0 | 0 | 1 |
| ## 152 | 0 | 28.50 | 3.040 | 2.540 | 1 | 0 | 1 | 1 | 70 | 0 | 1 |
| ## 153 | 0 | 68.67 | 15.000 | 0.000 | 1 | 0 | 14 | 1 | 0 | 3376 | 1 |
| ## 154 | 1 | 28.00 | 2.000 | 4.165 | 1 | 0 | 2 | 0 | 181 | 0 | 1 |
| ## 155 | 1 | 34.08 | 0.080 | 0.040 | 1 | 0 | 1 | 0 | 280 | 2000 | 1 |
| ## 156 | 1 | 27.67 | 2.000 | 1.000 | 1 | 0 | 4 | 1 | 140 | 7544 | 1 |
| ## 157 | 1 | 44.00 | 2.000 | 1.750 | 1 | 0 | 2 | 0 | 0 | 15 | 1 |
| ## 158 | 1 | 25.08 | 1.710 | 1.665 | 1 | 0 | 1 | 0 | 395 | 20 | 1 |
| ## 159 | 1 | 32.00 | 1.750 | 0.040 | 1 | 1 | 0 | 0 | 393 | 0 | 1 |
| ## 160 | 0 | 60.58 | 16.500 | 11.000 | 1 | 1 | 0 | 0 | 21 | 10561 | 1 |
| ## 161 | 0 | 40.83 | 10.000 | 1.750 | 1 | 1 | 0 | 1 | 29 | 837 | 1 |
| ## 162 | 1 | 19.33 | 9.500 | 1.000 | 1 | 1 | 0 | 0 | 60 | 400 | 1 |
| ## 163 | 0 | 32.33 | 0.540 | 0.040 | 1 | 1 | 0 | 1 | 440 | 11177 | 1 |
| ## 164 | 1 | 36.67 | 3.250 | 9.000 | 1 | 1 | 0 | 0 | 102 | 639 | 1 |
| ## 165 | 1 | 37.50 | 1.125 | 1.500 | 0 | 1 | 0 | 0 | 431 | 0 | 1 |
| ## 166 | 0 | 25.08 | 2.540 | 0.250 | 1 | 1 | 0 | 0 | 370 | 0 | 1 |
| ## 167 | 1 | 41.33 | 0.000 | 15.000 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## 168 | 1 | 56.00 | 12.500 | 8.000 | 1 | 1 | 0 | 0 | 24 | 2028 | 1 |
| ## 169 | 0 | 49.83 | 13.585 | 8.500 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## 170 | 1 | 22.67 | 10.500 | 1.335 | 1 | 1 | 0 | 1 | 100 | 0 | 1 |
| ## 171 | 1 | 27.00 | 1.500 | 0.375 | 1 | 1 | 0 | 0 | 260 | 1065 | 1 |

| | | | | | | | | | | | | |
|----|-----|---|-------|--------|--------|---|---|----|---|-----|-------|---|
| ## | 172 | 1 | 25.00 | 12.500 | 3.000 | 1 | 1 | 0 | 0 | 20 | 0 | 1 |
| ## | 173 | 0 | 26.08 | 8.665 | 1.415 | 1 | 1 | 0 | 1 | 160 | 150 | 1 |
| ## | 174 | 0 | 18.42 | 9.250 | 1.210 | 1 | 0 | 4 | 1 | 60 | 540 | 1 |
| ## | 175 | 1 | 20.17 | 8.170 | 1.960 | 1 | 0 | 14 | 1 | 60 | 158 | 1 |
| ## | 176 | 1 | 47.67 | 0.290 | 15.000 | 1 | 0 | 20 | 1 | 0 | 15000 | 1 |
| ## | 177 | 0 | 21.25 | 2.335 | 0.500 | 1 | 0 | 4 | 1 | 80 | 0 | 1 |
| ## | 178 | 0 | 20.67 | 3.000 | 0.165 | 1 | 0 | 3 | 1 | 100 | 6 | 1 |
| ## | 179 | 0 | 57.08 | 19.500 | 5.500 | 1 | 0 | 7 | 1 | 0 | 3000 | 1 |
| ## | 180 | 0 | 22.42 | 5.665 | 2.585 | 1 | 0 | 7 | 1 | 129 | 3257 | 1 |
| ## | 181 | 1 | 48.75 | 8.500 | 12.500 | 1 | 0 | 9 | 1 | 181 | 1655 | 1 |
| ## | 182 | 1 | 40.00 | 6.500 | 3.500 | 1 | 0 | 1 | 1 | 0 | 500 | 1 |
| ## | 183 | 1 | 40.58 | 5.000 | 5.000 | 1 | 0 | 7 | 1 | 0 | 3065 | 1 |
| ## | 184 | 0 | 28.67 | 1.040 | 2.500 | 1 | 0 | 5 | 0 | 300 | 1430 | 1 |
| ## | 185 | 0 | 33.08 | 4.625 | 1.625 | 1 | 0 | 2 | 1 | 0 | 0 | 1 |
| ## | 186 | 1 | 21.33 | 10.500 | 3.000 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## | 187 | 1 | 42.00 | 0.205 | 5.125 | 1 | 1 | 0 | 1 | 400 | 0 | 1 |
| ## | 188 | 1 | 41.75 | 0.960 | 2.500 | 1 | 1 | 0 | 1 | 510 | 600 | 1 |
| ## | 189 | 1 | 22.67 | 1.585 | 3.085 | 1 | 0 | 6 | 1 | 80 | 0 | 1 |
| ## | 190 | 1 | 34.50 | 4.040 | 8.500 | 1 | 0 | 7 | 0 | 195 | 0 | 1 |
| ## | 191 | 1 | 28.25 | 5.040 | 1.500 | 1 | 0 | 8 | 0 | 144 | 7 | 1 |
| ## | 192 | 1 | 33.17 | 3.165 | 3.165 | 1 | 0 | 3 | 0 | 380 | 0 | 1 |
| ## | 193 | 1 | 48.17 | 7.625 | 15.500 | 1 | 0 | 12 | 1 | 0 | 790 | 1 |
| ## | 194 | 1 | 27.58 | 2.040 | 2.000 | 1 | 0 | 3 | 0 | 370 | 560 | 1 |
| ## | 195 | 1 | 22.58 | 10.040 | 0.040 | 1 | 0 | 9 | 1 | 60 | 396 | 1 |
| ## | 196 | 0 | 24.08 | 0.500 | 1.250 | 1 | 0 | 1 | 1 | 0 | 678 | 1 |
| ## | 197 | 0 | 41.33 | 1.000 | 2.250 | 1 | 1 | 0 | 0 | 0 | 300 | 1 |
| ## | 198 | 0 | 20.75 | 10.250 | 0.710 | 1 | 0 | 2 | 0 | 49 | 0 | 1 |
| ## | 199 | 1 | 36.33 | 2.125 | 0.085 | 1 | 0 | 1 | 1 | 50 | 1187 | 1 |
| ## | 200 | 0 | 35.42 | 12.000 | 14.000 | 1 | 0 | 8 | 1 | 0 | 6590 | 1 |
| ## | 201 | 1 | 28.67 | 9.335 | 5.665 | 1 | 0 | 6 | 1 | 381 | 168 | 1 |
| ## | 202 | 1 | 35.17 | 2.500 | 4.500 | 1 | 0 | 7 | 1 | 150 | 1270 | 1 |
| ## | 203 | 1 | 39.50 | 4.250 | 6.500 | 1 | 0 | 16 | 1 | 117 | 1210 | 1 |
| ## | 204 | 1 | 39.33 | 5.875 | 10.000 | 1 | 0 | 14 | 0 | 399 | 0 | 1 |
| ## | 205 | 1 | 24.33 | 6.625 | 5.500 | 1 | 1 | 0 | 0 | 100 | 0 | 1 |
| ## | 206 | 1 | 60.08 | 14.500 | 18.000 | 1 | 0 | 15 | 0 | 0 | 1000 | 1 |
| ## | 207 | 1 | 23.08 | 11.500 | 3.500 | 1 | 0 | 9 | 1 | 56 | 742 | 1 |
| ## | 208 | 1 | 26.67 | 2.710 | 5.250 | 1 | 0 | 1 | 1 | 211 | 0 | 1 |
| ## | 209 | 1 | 48.17 | 3.500 | 3.500 | 1 | 1 | 0 | 1 | 230 | 0 | 1 |
| ## | 210 | 1 | 41.17 | 4.040 | 7.000 | 1 | 0 | 8 | 1 | 320 | 0 | 1 |
| ## | 211 | 1 | 55.92 | 11.500 | 5.000 | 1 | 0 | 5 | 1 | 0 | 8851 | 1 |
| ## | 212 | 1 | 53.92 | 9.625 | 8.665 | 1 | 0 | 5 | 1 | 0 | 0 | 1 |
| ## | 213 | 0 | 18.92 | 9.250 | 1.000 | 1 | 0 | 4 | 0 | 80 | 500 | 1 |
| ## | 214 | 0 | 50.08 | 12.540 | 2.290 | 1 | 0 | 3 | 0 | 156 | 0 | 1 |
| ## | 215 | 1 | 65.42 | 11.000 | 20.000 | 1 | 0 | 7 | 0 | 22 | 0 | 1 |
| ## | 216 | 0 | 17.58 | 9.000 | 1.375 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## | 217 | 0 | 18.83 | 9.540 | 0.085 | 1 | 1 | 0 | 1 | 100 | 0 | 1 |
| ## | 218 | 0 | 37.75 | 5.500 | 0.125 | 1 | 1 | 0 | 0 | 228 | 0 | 1 |
| ## | 219 | 1 | 23.25 | 4.000 | 0.250 | 1 | 1 | 0 | 0 | 160 | 0 | 1 |
| ## | 220 | 1 | 18.08 | 5.500 | 0.500 | 1 | 1 | 0 | 1 | 80 | 0 | 1 |
| ## | 221 | 0 | 22.50 | 8.460 | 2.460 | 0 | 1 | 0 | 1 | 164 | 0 | 1 |
| ## | 222 | 1 | 19.67 | 0.375 | 2.000 | 1 | 0 | 2 | 0 | 80 | 0 | 1 |
| ## | 223 | 1 | 22.08 | 11.000 | 0.665 | 1 | 1 | 0 | 1 | 100 | 0 | 1 |
| ## | 224 | 1 | 25.17 | 3.500 | 0.625 | 1 | 0 | 7 | 1 | 0 | 7059 | 1 |
| ## | 225 | 0 | 47.42 | 3.000 | 13.875 | 1 | 0 | 2 | 0 | 519 | 1704 | 1 |

| | | | | | | | | | | | | |
|----|-----|---|-------|--------|--------|---|---|----|---|-----|-------|---|
| ## | 226 | 1 | 33.50 | 1.750 | 4.500 | 1 | 0 | 4 | 0 | 253 | 857 | 1 |
| ## | 227 | 1 | 27.67 | 13.750 | 5.750 | 1 | 1 | 0 | 0 | 487 | 500 | 1 |
| ## | 228 | 0 | 58.42 | 21.000 | 10.000 | 1 | 0 | 13 | 1 | 0 | 6700 | 1 |
| ## | 229 | 0 | 20.67 | 1.835 | 2.085 | 1 | 0 | 5 | 1 | 220 | 2503 | 1 |
| ## | 230 | 1 | 26.17 | 0.250 | 0.000 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## | 231 | 1 | 21.33 | 7.500 | 1.415 | 1 | 0 | 1 | 1 | 80 | 9800 | 1 |
| ## | 232 | 1 | 42.83 | 4.625 | 4.580 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## | 233 | 1 | 38.17 | 10.125 | 2.500 | 1 | 0 | 6 | 1 | 520 | 196 | 1 |
| ## | 234 | 1 | 20.50 | 10.000 | 2.500 | 1 | 1 | 0 | 1 | 40 | 0 | 1 |
| ## | 235 | 1 | 48.25 | 25.085 | 1.750 | 1 | 0 | 3 | 1 | 120 | 14 | 1 |
| ## | 236 | 1 | 28.33 | 5.000 | 11.000 | 1 | 1 | 0 | 0 | 70 | 0 | 1 |
| ## | 237 | 1 | 18.50 | 2.000 | 1.500 | 1 | 0 | 2 | 1 | 120 | 300 | 1 |
| ## | 238 | 1 | 33.17 | 3.040 | 2.040 | 1 | 0 | 1 | 0 | 180 | 18027 | 1 |
| ## | 239 | 1 | 45.00 | 8.500 | 14.000 | 1 | 0 | 1 | 0 | 88 | 2000 | 1 |
| ## | 240 | 0 | 19.67 | 0.210 | 0.290 | 1 | 0 | 11 | 1 | 80 | 99 | 1 |
| ## | 241 | 1 | 21.83 | 11.000 | 0.290 | 1 | 0 | 6 | 1 | 121 | 0 | 1 |
| ## | 242 | 1 | 40.25 | 21.500 | 20.000 | 1 | 0 | 11 | 1 | 0 | 1200 | 1 |
| ## | 243 | 1 | 41.42 | 5.000 | 5.000 | 1 | 0 | 6 | 0 | 470 | 0 | 1 |
| ## | 244 | 0 | 17.83 | 11.000 | 1.000 | 1 | 0 | 11 | 1 | 0 | 3000 | 1 |
| ## | 245 | 1 | 23.17 | 11.125 | 0.460 | 1 | 0 | 1 | 1 | 100 | 0 | 1 |
| ## | 246 | 1 | 18.17 | 10.250 | 1.085 | 0 | 1 | 0 | 1 | 320 | 13 | 0 |
| ## | 247 | 1 | 20.00 | 11.045 | 2.000 | 0 | 1 | 0 | 0 | 136 | 0 | 0 |
| ## | 248 | 1 | 20.00 | 0.000 | 0.500 | 0 | 1 | 0 | 1 | 144 | 0 | 0 |
| ## | 249 | 0 | 20.75 | 9.540 | 0.040 | 0 | 1 | 0 | 1 | 200 | 1000 | 0 |
| ## | 250 | 0 | 24.50 | 1.750 | 0.165 | 0 | 1 | 0 | 1 | 132 | 0 | 0 |
| ## | 251 | 1 | 32.75 | 2.335 | 5.750 | 0 | 1 | 0 | 0 | 292 | 0 | 0 |
| ## | 252 | 0 | 52.17 | 0.000 | 0.000 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## | 253 | 0 | 48.17 | 1.335 | 0.335 | 0 | 1 | 0 | 1 | 0 | 120 | 0 |
| ## | 254 | 0 | 20.42 | 10.500 | 0.000 | 0 | 1 | 0 | 0 | 154 | 32 | 0 |
| ## | 255 | 1 | 50.75 | 0.585 | 0.000 | 0 | 1 | 0 | 1 | 145 | 0 | 0 |
| ## | 256 | 1 | 17.08 | 0.085 | 0.040 | 0 | 1 | 0 | 1 | 140 | 722 | 0 |
| ## | 257 | 1 | 18.33 | 1.210 | 0.000 | 0 | 1 | 0 | 1 | 100 | 0 | 0 |
| ## | 258 | 0 | 32.00 | 6.000 | 1.250 | 0 | 1 | 0 | 1 | 272 | 0 | 0 |
| ## | 259 | 1 | 59.67 | 1.540 | 0.125 | 1 | 1 | 0 | 0 | 260 | 0 | 1 |
| ## | 260 | 1 | 18.00 | 0.165 | 0.210 | 0 | 1 | 0 | 1 | 200 | 40 | 1 |
| ## | 261 | 1 | 32.33 | 2.500 | 1.250 | 0 | 1 | 0 | 0 | 280 | 0 | 0 |
| ## | 262 | 1 | 18.08 | 6.750 | 0.040 | 0 | 1 | 0 | 1 | 140 | 0 | 0 |
| ## | 263 | 1 | 38.25 | 10.125 | 0.125 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 264 | 1 | 30.67 | 2.500 | 2.250 | 0 | 1 | 0 | 0 | 340 | 0 | 0 |
| ## | 265 | 1 | 18.58 | 5.710 | 0.540 | 0 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## | 266 | 0 | 19.17 | 5.415 | 0.290 | 0 | 1 | 0 | 1 | 80 | 484 | 0 |
| ## | 267 | 0 | 18.17 | 10.000 | 0.165 | 0 | 1 | 0 | 1 | 340 | 0 | 0 |
| ## | 268 | 1 | 16.25 | 0.835 | 0.085 | 1 | 1 | 0 | 1 | 200 | 0 | 0 |
| ## | 269 | 1 | 21.17 | 0.875 | 0.250 | 0 | 1 | 0 | 1 | 280 | 204 | 0 |
| ## | 270 | 1 | 23.92 | 0.585 | 0.125 | 0 | 1 | 0 | 1 | 240 | 1 | 0 |
| ## | 271 | 1 | 17.67 | 4.460 | 0.250 | 0 | 1 | 0 | 1 | 80 | 0 | 0 |
| ## | 272 | 0 | 16.50 | 1.250 | 0.250 | 0 | 0 | 1 | 1 | 108 | 98 | 0 |
| ## | 273 | 1 | 23.25 | 12.625 | 0.125 | 0 | 0 | 2 | 1 | 0 | 5552 | 0 |
| ## | 274 | 1 | 17.58 | 10.000 | 0.165 | 0 | 0 | 1 | 1 | 120 | 1 | 0 |
| ## | 275 | 1 | 29.50 | 0.580 | 0.290 | 0 | 0 | 1 | 1 | 340 | 2803 | 0 |
| ## | 276 | 1 | 18.83 | 0.415 | 0.165 | 0 | 0 | 1 | 1 | 200 | 1 | 0 |
| ## | 277 | 0 | 21.75 | 1.750 | 0.000 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 278 | 1 | 23.00 | 0.750 | 0.500 | 0 | 1 | 0 | 0 | 320 | 0 | 0 |
| ## | 279 | 0 | 18.25 | 10.000 | 1.000 | 0 | 0 | 1 | 1 | 120 | 1 | 0 |

| | | | | | | | | | | | | |
|----|-----|---|-------|--------|--------|---|---|----|---|-----|--------|---|
| ## | 280 | 1 | 25.42 | 0.540 | 0.165 | 0 | 0 | 1 | 1 | 272 | 444 | 0 |
| ## | 281 | 1 | 35.75 | 2.415 | 0.125 | 0 | 0 | 2 | 1 | 220 | 1 | 0 |
| ## | 282 | 0 | 16.08 | 0.335 | 0.000 | 0 | 0 | 1 | 1 | 160 | 126 | 0 |
| ## | 283 | 0 | 31.92 | 3.125 | 3.040 | 0 | 0 | 2 | 0 | 200 | 4 | 0 |
| ## | 284 | 1 | 69.17 | 9.000 | 4.000 | 0 | 0 | 1 | 1 | 70 | 6 | 0 |
| ## | 285 | 1 | 32.92 | 2.500 | 1.750 | 0 | 0 | 2 | 0 | 720 | 0 | 0 |
| ## | 286 | 1 | 16.33 | 2.750 | 0.665 | 0 | 0 | 1 | 1 | 80 | 21 | 0 |
| ## | 287 | 1 | 22.17 | 12.125 | 3.335 | 0 | 0 | 2 | 0 | 180 | 173 | 0 |
| ## | 288 | 0 | 57.58 | 2.000 | 6.500 | 0 | 0 | 1 | 1 | 0 | 10 | 0 |
| ## | 289 | 1 | 18.25 | 0.165 | 0.250 | 0 | 1 | 0 | 0 | 280 | 0 | 0 |
| ## | 290 | 1 | 23.42 | 1.000 | 0.500 | 0 | 1 | 0 | 0 | 280 | 0 | 0 |
| ## | 291 | 0 | 15.92 | 2.875 | 0.085 | 0 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## | 292 | 0 | 24.75 | 13.665 | 1.500 | 0 | 1 | 0 | 1 | 280 | 1 | 0 |
| ## | 293 | 1 | 48.75 | 26.335 | 0.000 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| ## | 294 | 1 | 23.50 | 2.750 | 4.500 | 0 | 1 | 0 | 1 | 160 | 25 | 0 |
| ## | 295 | 1 | 18.58 | 10.290 | 0.415 | 0 | 1 | 0 | 1 | 80 | 0 | 0 |
| ## | 296 | 1 | 27.75 | 1.290 | 0.250 | 0 | 1 | 0 | 0 | 140 | 0 | 0 |
| ## | 297 | 0 | 31.75 | 3.000 | 0.000 | 0 | 1 | 0 | 1 | 160 | 20 | 0 |
| ## | 298 | 0 | 24.83 | 4.500 | 1.000 | 0 | 1 | 0 | 0 | 360 | 6 | 0 |
| ## | 299 | 1 | 19.00 | 1.750 | 2.335 | 0 | 1 | 0 | 0 | 112 | 6 | 0 |
| ## | 300 | 0 | 16.33 | 0.210 | 0.125 | 0 | 1 | 0 | 1 | 200 | 1 | 0 |
| ## | 301 | 0 | 18.58 | 10.000 | 0.415 | 0 | 1 | 0 | 1 | 80 | 42 | 0 |
| ## | 302 | 1 | 16.25 | 0.000 | 0.250 | 0 | 1 | 0 | 1 | 60 | 0 | 0 |
| ## | 303 | 1 | 23.00 | 0.750 | 0.500 | 1 | 1 | 0 | 0 | 320 | 0 | 0 |
| ## | 304 | 1 | 21.17 | 0.250 | 0.250 | 0 | 1 | 0 | 1 | 280 | 204 | 0 |
| ## | 305 | 1 | 17.50 | 22.000 | 0.000 | 0 | 1 | 0 | 0 | 450 | 100000 | 1 |
| ## | 306 | 1 | 19.17 | 0.000 | 0.000 | 0 | 1 | 0 | 0 | 500 | 1 | 1 |
| ## | 307 | 1 | 36.75 | 0.125 | 1.500 | 0 | 1 | 0 | 0 | 232 | 113 | 1 |
| ## | 308 | 1 | 21.25 | 1.500 | 1.500 | 0 | 1 | 0 | 1 | 150 | 8 | 1 |
| ## | 309 | 0 | 18.08 | 0.375 | 10.000 | 0 | 1 | 0 | 0 | 300 | 0 | 1 |
| ## | 310 | 0 | 33.67 | 0.375 | 0.375 | 0 | 1 | 0 | 1 | 300 | 44 | 1 |
| ## | 311 | 1 | 48.58 | 0.205 | 0.250 | 1 | 0 | 11 | 1 | 380 | 2732 | 1 |
| ## | 312 | 1 | 33.67 | 1.250 | 1.165 | 0 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## | 313 | 0 | 29.50 | 1.085 | 1.000 | 0 | 1 | 0 | 1 | 280 | 13 | 0 |
| ## | 314 | 1 | 30.17 | 1.085 | 0.040 | 0 | 1 | 0 | 1 | 170 | 179 | 0 |
| ## | 315 | 1 | 34.83 | 2.500 | 3.000 | 0 | 1 | 0 | 1 | 200 | 0 | 0 |
| ## | 316 | 0 | 33.25 | 2.500 | 2.500 | 0 | 1 | 0 | 0 | 0 | 2 | 0 |
| ## | 317 | 1 | 34.08 | 2.500 | 1.000 | 0 | 1 | 0 | 1 | 460 | 16 | 0 |
| ## | 318 | 0 | 25.25 | 12.500 | 1.000 | 0 | 1 | 0 | 0 | 180 | 1062 | 0 |
| ## | 319 | 1 | 34.75 | 2.500 | 0.500 | 0 | 1 | 0 | 1 | 348 | 0 | 0 |
| ## | 320 | 1 | 27.67 | 0.750 | 0.165 | 0 | 1 | 0 | 0 | 220 | 251 | 0 |
| ## | 321 | 1 | 47.33 | 6.500 | 1.000 | 0 | 1 | 0 | 0 | 0 | 228 | 0 |
| ## | 322 | 0 | 34.83 | 1.250 | 0.500 | 0 | 1 | 0 | 0 | 160 | 0 | 0 |
| ## | 323 | 0 | 33.25 | 3.000 | 2.000 | 0 | 1 | 0 | 1 | 180 | 0 | 0 |
| ## | 324 | 1 | 28.00 | 3.000 | 0.750 | 0 | 1 | 0 | 0 | 300 | 67 | 0 |
| ## | 325 | 0 | 39.08 | 4.000 | 3.000 | 0 | 1 | 0 | 1 | 480 | 0 | 0 |
| ## | 326 | 1 | 42.75 | 4.085 | 0.040 | 0 | 1 | 0 | 1 | 108 | 100 | 0 |
| ## | 327 | 1 | 26.92 | 2.250 | 0.500 | 0 | 1 | 0 | 0 | 640 | 4000 | 0 |
| ## | 328 | 1 | 33.75 | 2.750 | 0.000 | 0 | 1 | 0 | 1 | 180 | 0 | 0 |
| ## | 329 | 1 | 38.92 | 1.750 | 0.500 | 0 | 1 | 0 | 0 | 300 | 2 | 0 |
| ## | 330 | 1 | 62.75 | 7.000 | 0.000 | 0 | 1 | 0 | 1 | 0 | 12 | 0 |
| ## | 331 | 1 | 26.75 | 4.500 | 2.500 | 0 | 1 | 0 | 1 | 200 | 1210 | 0 |
| ## | 332 | 1 | 63.33 | 0.540 | 0.585 | 1 | 0 | 3 | 0 | 180 | 0 | 0 |
| ## | 333 | 1 | 27.83 | 1.500 | 2.250 | 0 | 0 | 1 | 0 | 100 | 3 | 0 |

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|----|-----|---|-------|--------|--------|---|---|---|---|-----|------|---|
| ## | 334 | 0 | 26.17 | 2.000 | 0.000 | 0 | 1 | 0 | 0 | 276 | 1 | 0 |
| ## | 335 | 1 | 22.17 | 0.585 | 0.000 | 0 | 1 | 0 | 1 | 100 | 0 | 0 |
| ## | 336 | 1 | 22.50 | 11.500 | 1.500 | 0 | 1 | 0 | 0 | 0 | 4000 | 0 |
| ## | 337 | 1 | 30.75 | 1.585 | 0.585 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ## | 338 | 1 | 36.67 | 2.000 | 0.250 | 0 | 1 | 0 | 0 | 221 | 0 | 0 |
| ## | 339 | 0 | 16.00 | 0.165 | 1.000 | 0 | 0 | 2 | 0 | 320 | 1 | 0 |
| ## | 340 | 1 | 41.17 | 1.335 | 0.165 | 0 | 1 | 0 | 1 | 168 | 0 | 0 |
| ## | 341 | 0 | 19.50 | 0.165 | 0.040 | 0 | 1 | 0 | 0 | 380 | 0 | 0 |
| ## | 342 | 1 | 32.42 | 3.000 | 0.165 | 0 | 1 | 0 | 0 | 120 | 0 | 0 |
| ## | 343 | 0 | 36.75 | 4.710 | 0.000 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 344 | 0 | 30.25 | 5.500 | 5.500 | 0 | 1 | 0 | 0 | 100 | 0 | 0 |
| ## | 345 | 1 | 23.08 | 2.500 | 0.085 | 0 | 1 | 0 | 0 | 100 | 4208 | 0 |
| ## | 346 | 1 | 26.83 | 0.540 | 0.000 | 0 | 1 | 0 | 1 | 100 | 0 | 0 |
| ## | 347 | 1 | 16.92 | 0.335 | 0.290 | 0 | 1 | 0 | 1 | 200 | 0 | 0 |
| ## | 348 | 1 | 24.42 | 2.000 | 0.165 | 0 | 0 | 2 | 1 | 320 | 1300 | 0 |
| ## | 349 | 1 | 42.83 | 1.250 | 13.875 | 0 | 0 | 1 | 0 | 352 | 112 | 0 |
| ## | 350 | 0 | 22.75 | 6.165 | 0.165 | 0 | 1 | 0 | 1 | 220 | 1000 | 0 |
| ## | 351 | 1 | 39.42 | 1.710 | 0.165 | 0 | 1 | 0 | 1 | 400 | 0 | 0 |
| ## | 352 | 0 | 23.58 | 11.500 | 3.000 | 0 | 1 | 0 | 0 | 20 | 16 | 0 |
| ## | 353 | 1 | 21.42 | 0.750 | 0.750 | 0 | 1 | 0 | 0 | 132 | 2 | 0 |
| ## | 354 | 1 | 33.00 | 2.500 | 7.000 | 0 | 1 | 0 | 0 | 280 | 0 | 0 |
| ## | 355 | 1 | 26.33 | 13.000 | 0.000 | 0 | 1 | 0 | 0 | 140 | 1110 | 0 |
| ## | 356 | 0 | 45.00 | 4.585 | 1.000 | 0 | 1 | 0 | 0 | 240 | 0 | 0 |
| ## | 357 | 1 | 26.25 | 1.540 | 0.125 | 0 | 1 | 0 | 1 | 100 | 0 | 0 |
| ## | 358 | 0 | 20.83 | 0.500 | 1.000 | 0 | 1 | 0 | 1 | 260 | 0 | 0 |
| ## | 359 | 1 | 28.67 | 14.500 | 0.125 | 0 | 1 | 0 | 1 | 0 | 286 | 0 |
| ## | 360 | 1 | 20.67 | 0.835 | 2.000 | 0 | 1 | 0 | 0 | 240 | 0 | 0 |
| ## | 361 | 1 | 34.42 | 1.335 | 0.125 | 0 | 1 | 0 | 0 | 440 | 4500 | 0 |
| ## | 362 | 1 | 33.58 | 0.250 | 4.000 | 0 | 1 | 0 | 0 | 420 | 0 | 0 |
| ## | 363 | 1 | 43.17 | 5.000 | 2.250 | 0 | 1 | 0 | 0 | 141 | 0 | 0 |
| ## | 364 | 0 | 22.67 | 7.000 | 0.165 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 365 | 0 | 24.33 | 2.500 | 4.500 | 0 | 1 | 0 | 1 | 200 | 456 | 0 |
| ## | 366 | 0 | 56.83 | 4.250 | 5.000 | 0 | 1 | 0 | 0 | 0 | 4 | 0 |
| ## | 367 | 1 | 22.08 | 11.460 | 1.585 | 0 | 1 | 0 | 0 | 100 | 1212 | 0 |
| ## | 368 | 1 | 34.00 | 5.500 | 1.500 | 0 | 1 | 0 | 0 | 60 | 0 | 0 |
| ## | 369 | 1 | 22.58 | 1.500 | 0.540 | 0 | 1 | 0 | 0 | 120 | 67 | 0 |
| ## | 370 | 1 | 21.17 | 0.000 | 0.500 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ## | 371 | 1 | 26.67 | 14.585 | 0.000 | 0 | 1 | 0 | 0 | 178 | 0 | 0 |
| ## | 372 | 1 | 22.92 | 0.170 | 0.085 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## | 373 | 1 | 15.17 | 7.000 | 1.000 | 0 | 1 | 0 | 1 | 600 | 0 | 0 |
| ## | 374 | 1 | 39.92 | 5.000 | 0.210 | 0 | 1 | 0 | 1 | 550 | 0 | 0 |
| ## | 375 | 1 | 27.42 | 12.500 | 0.250 | 0 | 1 | 0 | 0 | 720 | 0 | 0 |
| ## | 376 | 1 | 24.75 | 0.540 | 1.000 | 0 | 1 | 0 | 0 | 120 | 1 | 0 |
| ## | 377 | 1 | 41.17 | 1.250 | 0.250 | 0 | 1 | 0 | 1 | 0 | 195 | 0 |
| ## | 378 | 0 | 33.08 | 1.625 | 0.540 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ## | 379 | 1 | 29.83 | 2.040 | 0.040 | 0 | 1 | 0 | 1 | 128 | 1 | 0 |
| ## | 380 | 0 | 23.58 | 0.585 | 0.125 | 0 | 1 | 0 | 1 | 120 | 87 | 0 |
| ## | 381 | 1 | 26.17 | 12.500 | 1.250 | 0 | 1 | 0 | 0 | 0 | 17 | 0 |
| ## | 382 | 1 | 31.00 | 2.085 | 0.085 | 0 | 1 | 0 | 1 | 300 | 0 | 0 |
| ## | 383 | 1 | 20.75 | 5.085 | 0.290 | 0 | 1 | 0 | 1 | 140 | 184 | 0 |
| ## | 384 | 1 | 28.92 | 0.375 | 0.290 | 0 | 1 | 0 | 1 | 220 | 140 | 0 |
| ## | 385 | 0 | 51.92 | 6.500 | 3.085 | 0 | 1 | 0 | 0 | 73 | 0 | 0 |
| ## | 386 | 0 | 22.67 | 0.335 | 0.750 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 387 | 1 | 34.00 | 5.085 | 1.085 | 0 | 1 | 0 | 0 | 480 | 0 | 0 |

| | | | | | | | | | | | |
|--------|---|-------|--------|-------|---|---|----|---|------|------|---|
| ## 388 | 0 | 69.50 | 6.000 | 0.000 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 389 | 0 | 19.58 | 0.665 | 1.000 | 0 | 0 | 1 | 1 | 2000 | 2 | 0 |
| ## 390 | 1 | 16.00 | 3.125 | 0.085 | 0 | 0 | 1 | 1 | 0 | 6 | 0 |
| ## 391 | 1 | 17.08 | 0.250 | 0.335 | 0 | 0 | 4 | 1 | 160 | 8 | 0 |
| ## 392 | 1 | 31.25 | 2.835 | 0.000 | 0 | 0 | 5 | 1 | 176 | 146 | 0 |
| ## 393 | 1 | 25.17 | 3.000 | 1.250 | 0 | 0 | 1 | 1 | 0 | 22 | 0 |
| ## 394 | 0 | 22.67 | 0.790 | 0.085 | 0 | 1 | 0 | 1 | 144 | 0 | 0 |
| ## 395 | 1 | 40.58 | 1.500 | 0.000 | 0 | 1 | 0 | 1 | 300 | 0 | 0 |
| ## 396 | 1 | 22.25 | 0.460 | 0.125 | 0 | 1 | 0 | 0 | 280 | 55 | 0 |
| ## 397 | 0 | 22.25 | 1.250 | 3.250 | 0 | 1 | 0 | 1 | 280 | 0 | 0 |
| ## 398 | 1 | 22.50 | 0.125 | 0.125 | 0 | 1 | 0 | 1 | 200 | 70 | 0 |
| ## 399 | 1 | 23.58 | 1.790 | 0.540 | 0 | 1 | 0 | 0 | 136 | 1 | 0 |
| ## 400 | 1 | 38.42 | 0.705 | 0.375 | 0 | 0 | 2 | 1 | 225 | 500 | 0 |
| ## 401 | 0 | 26.58 | 2.540 | 0.000 | 0 | 1 | 0 | 0 | 180 | 60 | 0 |
| ## 402 | 1 | 35.00 | 2.500 | 1.000 | 0 | 1 | 0 | 0 | 210 | 0 | 0 |
| ## 403 | 1 | 20.42 | 1.085 | 1.500 | 0 | 1 | 0 | 1 | 108 | 7 | 0 |
| ## 404 | 1 | 29.42 | 1.250 | 1.750 | 0 | 1 | 0 | 1 | 200 | 0 | 0 |
| ## 405 | 1 | 26.17 | 0.835 | 1.165 | 0 | 1 | 0 | 1 | 100 | 0 | 0 |
| ## 406 | 1 | 33.67 | 2.165 | 1.500 | 0 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## 407 | 1 | 24.58 | 1.250 | 0.250 | 0 | 1 | 0 | 1 | 110 | 0 | 0 |
| ## 408 | 0 | 27.67 | 2.040 | 0.250 | 0 | 1 | 0 | 0 | 180 | 50 | 0 |
| ## 409 | 1 | 37.50 | 0.835 | 0.040 | 0 | 1 | 0 | 1 | 120 | 5 | 0 |
| ## 410 | 1 | 49.17 | 2.290 | 0.290 | 0 | 1 | 0 | 1 | 200 | 3 | 0 |
| ## 411 | 1 | 33.58 | 0.335 | 0.085 | 0 | 1 | 0 | 1 | 180 | 0 | 0 |
| ## 412 | 1 | 51.83 | 3.000 | 1.500 | 0 | 1 | 0 | 1 | 180 | 4 | 0 |
| ## 413 | 1 | 22.92 | 3.165 | 0.165 | 0 | 1 | 0 | 1 | 160 | 1058 | 0 |
| ## 414 | 1 | 21.83 | 1.540 | 0.085 | 0 | 1 | 0 | 0 | 356 | 0 | 0 |
| ## 415 | 1 | 25.25 | 1.000 | 0.500 | 0 | 1 | 0 | 1 | 200 | 0 | 0 |
| ## 416 | 1 | 58.58 | 2.710 | 2.415 | 0 | 1 | 0 | 0 | 320 | 0 | 0 |
| ## 417 | 1 | 19.00 | 0.000 | 0.000 | 0 | 0 | 4 | 1 | 45 | 1 | 0 |
| ## 418 | 1 | 19.58 | 0.585 | 0.000 | 0 | 0 | 3 | 1 | 350 | 769 | 0 |
| ## 419 | 0 | 53.33 | 0.165 | 0.000 | 0 | 1 | 0 | 0 | 62 | 27 | 0 |
| ## 420 | 0 | 27.17 | 1.250 | 0.000 | 0 | 0 | 1 | 1 | 92 | 300 | 0 |
| ## 421 | 1 | 25.92 | 0.875 | 0.375 | 0 | 0 | 2 | 0 | 174 | 3 | 0 |
| ## 422 | 1 | 23.08 | 0.000 | 1.000 | 0 | 0 | 11 | 1 | 0 | 0 | 0 |
| ## 423 | 1 | 39.58 | 5.000 | 0.000 | 0 | 0 | 2 | 1 | 17 | 1 | 0 |
| ## 424 | 1 | 30.58 | 2.710 | 0.125 | 0 | 1 | 0 | 0 | 80 | 0 | 0 |
| ## 425 | 1 | 17.25 | 3.000 | 0.040 | 0 | 1 | 0 | 0 | 160 | 40 | 0 |
| ## 426 | 0 | 17.67 | 0.000 | 0.000 | 0 | 1 | 0 | 1 | 86 | 0 | 0 |
| ## 427 | 1 | 16.50 | 0.125 | 0.165 | 0 | 1 | 0 | 1 | 132 | 0 | 0 |
| ## 428 | 0 | 27.33 | 1.665 | 0.000 | 0 | 1 | 0 | 1 | 340 | 1 | 0 |
| ## 429 | 1 | 31.25 | 1.125 | 0.000 | 0 | 0 | 1 | 1 | 96 | 19 | 0 |
| ## 430 | 1 | 20.00 | 7.000 | 0.500 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 431 | 1 | 39.50 | 1.625 | 1.500 | 0 | 1 | 0 | 1 | 0 | 316 | 0 |
| ## 432 | 1 | 36.50 | 4.250 | 3.500 | 0 | 1 | 0 | 1 | 454 | 50 | 0 |
| ## 433 | 1 | 52.42 | 1.500 | 3.750 | 0 | 1 | 0 | 0 | 0 | 350 | 0 |
| ## 434 | 1 | 36.17 | 18.125 | 0.085 | 0 | 1 | 0 | 1 | 320 | 3552 | 0 |
| ## 435 | 1 | 29.67 | 0.750 | 0.040 | 0 | 1 | 0 | 1 | 240 | 0 | 0 |
| ## 436 | 1 | 36.17 | 5.500 | 5.000 | 0 | 1 | 0 | 1 | 210 | 687 | 0 |
| ## 437 | 1 | 25.67 | 0.290 | 1.500 | 0 | 1 | 0 | 0 | 160 | 0 | 0 |
| ## 438 | 0 | 24.50 | 2.415 | 0.000 | 0 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## 439 | 1 | 24.08 | 0.875 | 0.085 | 0 | 0 | 4 | 1 | 254 | 1950 | 0 |
| ## 440 | 1 | 21.92 | 0.500 | 0.125 | 0 | 1 | 0 | 1 | 360 | 0 | 0 |
| ## 441 | 0 | 36.58 | 0.290 | 0.000 | 0 | 0 | 10 | 1 | 200 | 18 | 0 |

| | | | | | | | | | | | |
|--------|---|-------|--------|--------|---|---|----|---|-----|------|---|
| ## 442 | 0 | 23.00 | 1.835 | 0.000 | 0 | 0 | 1 | 1 | 200 | 53 | 0 |
| ## 443 | 0 | 27.58 | 3.000 | 2.790 | 0 | 0 | 1 | 0 | 280 | 10 | 0 |
| ## 444 | 1 | 31.08 | 3.085 | 2.500 | 0 | 0 | 2 | 0 | 160 | 41 | 0 |
| ## 445 | 0 | 30.42 | 1.375 | 0.040 | 0 | 0 | 3 | 1 | 0 | 33 | 0 |
| ## 446 | 1 | 22.08 | 2.335 | 0.750 | 0 | 1 | 0 | 1 | 180 | 0 | 0 |
| ## 447 | 1 | 16.33 | 4.085 | 0.415 | 0 | 1 | 0 | 0 | 120 | 0 | 0 |
| ## 448 | 0 | 21.92 | 11.665 | 0.085 | 0 | 1 | 0 | 1 | 320 | 5 | 0 |
| ## 449 | 1 | 21.08 | 4.125 | 0.040 | 0 | 1 | 0 | 1 | 140 | 100 | 0 |
| ## 450 | 1 | 17.42 | 6.500 | 0.125 | 0 | 1 | 0 | 1 | 60 | 100 | 0 |
| ## 451 | 1 | 19.17 | 4.000 | 1.000 | 0 | 1 | 0 | 0 | 360 | 1000 | 0 |
| ## 452 | 1 | 20.67 | 0.415 | 0.125 | 0 | 1 | 0 | 1 | 0 | 44 | 0 |
| ## 453 | 1 | 26.75 | 2.000 | 0.750 | 0 | 1 | 0 | 0 | 80 | 0 | 0 |
| ## 454 | 1 | 23.58 | 0.835 | 0.085 | 0 | 1 | 0 | 0 | 220 | 5 | 0 |
| ## 455 | 1 | 39.17 | 2.500 | 10.000 | 0 | 1 | 0 | 0 | 200 | 0 | 0 |
| ## 456 | 1 | 22.75 | 11.500 | 0.415 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 457 | 0 | 16.92 | 0.500 | 0.165 | 0 | 0 | 6 | 0 | 240 | 35 | 0 |
| ## 458 | 1 | 23.50 | 3.165 | 0.415 | 0 | 0 | 1 | 0 | 280 | 80 | 0 |
| ## 459 | 0 | 17.33 | 9.500 | 1.750 | 0 | 0 | 10 | 0 | 0 | 10 | 0 |
| ## 460 | 1 | 23.75 | 0.415 | 0.040 | 0 | 0 | 2 | 1 | 128 | 6 | 0 |
| ## 461 | 1 | 34.67 | 1.080 | 1.165 | 0 | 1 | 0 | 1 | 28 | 0 | 0 |
| ## 462 | 1 | 74.83 | 19.000 | 0.040 | 0 | 0 | 2 | 1 | 0 | 351 | 0 |
| ## 463 | 1 | 28.17 | 0.125 | 0.085 | 0 | 1 | 0 | 1 | 216 | 2100 | 0 |
| ## 464 | 1 | 24.50 | 13.335 | 0.040 | 0 | 1 | 0 | 0 | 120 | 475 | 0 |
| ## 465 | 1 | 18.83 | 3.540 | 0.000 | 0 | 1 | 0 | 0 | 180 | 1 | 0 |
| ## 466 | 0 | 47.25 | 0.750 | 2.750 | 1 | 0 | 1 | 1 | 333 | 892 | 1 |
| ## 467 | 1 | 24.17 | 0.875 | 4.625 | 1 | 0 | 2 | 0 | 520 | 2000 | 1 |
| ## 468 | 1 | 39.25 | 9.500 | 6.500 | 1 | 0 | 14 | 1 | 240 | 4607 | 1 |
| ## 469 | 0 | 20.50 | 11.835 | 6.000 | 1 | 1 | 0 | 1 | 340 | 0 | 1 |
| ## 470 | 0 | 18.83 | 4.415 | 3.000 | 1 | 1 | 0 | 1 | 240 | 0 | 1 |
| ## 471 | 1 | 19.17 | 9.500 | 1.500 | 1 | 1 | 0 | 1 | 120 | 2206 | 1 |
| ## 472 | 0 | 25.00 | 0.875 | 1.040 | 1 | 1 | 0 | 0 | 160 | 5860 | 1 |
| ## 473 | 1 | 20.17 | 9.250 | 1.665 | 1 | 0 | 3 | 0 | 40 | 28 | 1 |
| ## 474 | 1 | 25.75 | 0.500 | 1.460 | 1 | 0 | 5 | 0 | 312 | 0 | 1 |
| ## 475 | 1 | 20.42 | 7.000 | 1.625 | 1 | 0 | 3 | 1 | 200 | 1391 | 1 |
| ## 476 | 1 | 39.00 | 5.000 | 3.500 | 1 | 0 | 10 | 0 | 0 | 0 | 1 |
| ## 477 | 0 | 64.08 | 0.165 | 0.000 | 1 | 0 | 1 | 1 | 232 | 100 | 1 |
| ## 478 | 1 | 28.25 | 5.125 | 4.750 | 1 | 0 | 2 | 1 | 420 | 7 | 1 |
| ## 479 | 0 | 28.75 | 3.750 | 1.085 | 1 | 0 | 1 | 0 | 371 | 0 | 1 |
| ## 480 | 1 | 31.33 | 19.500 | 7.000 | 1 | 0 | 16 | 1 | 0 | 5000 | 1 |
| ## 481 | 0 | 18.92 | 9.000 | 0.750 | 1 | 0 | 2 | 1 | 88 | 591 | 1 |
| ## 482 | 0 | 24.75 | 3.000 | 1.835 | 1 | 0 | 19 | 1 | 0 | 500 | 1 |
| ## 483 | 0 | 30.67 | 12.000 | 2.000 | 1 | 0 | 1 | 1 | 220 | 19 | 1 |
| ## 484 | 1 | 21.00 | 4.790 | 2.250 | 1 | 0 | 1 | 0 | 80 | 300 | 1 |
| ## 485 | 1 | 13.75 | 4.000 | 1.750 | 1 | 0 | 2 | 0 | 120 | 1000 | 1 |
| ## 486 | 0 | 46.00 | 4.000 | 0.000 | 1 | 1 | 0 | 1 | 100 | 960 | 1 |
| ## 487 | 0 | 44.33 | 0.000 | 2.500 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## 488 | 1 | 20.25 | 9.960 | 0.000 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## 489 | 1 | 22.67 | 2.540 | 2.585 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## 490 | 0 | 60.92 | 5.000 | 4.000 | 1 | 0 | 4 | 1 | 0 | 99 | 1 |
| ## 491 | 1 | 16.08 | 0.750 | 1.750 | 1 | 0 | 5 | 0 | 352 | 690 | 1 |
| ## 492 | 0 | 28.17 | 0.375 | 0.585 | 1 | 0 | 4 | 1 | 80 | 0 | 1 |
| ## 493 | 1 | 39.17 | 1.710 | 0.125 | 1 | 0 | 5 | 0 | 480 | 0 | 1 |
| ## 494 | 0 | 30.00 | 5.290 | 2.250 | 1 | 0 | 5 | 0 | 99 | 500 | 1 |
| ## 495 | 1 | 22.83 | 3.000 | 1.290 | 1 | 0 | 1 | 1 | 260 | 800 | 1 |

| | | | | | | | | | | | |
|--------|---|-------|--------|--------|---|---|----|---|-----|------|---|
| ## 496 | 0 | 22.50 | 8.500 | 1.750 | 1 | 0 | 10 | 1 | 80 | 990 | 0 |
| ## 497 | 0 | 28.58 | 1.665 | 2.415 | 1 | 1 | 0 | 0 | 440 | 0 | 0 |
| ## 498 | 1 | 45.17 | 1.500 | 2.500 | 1 | 1 | 0 | 0 | 140 | 0 | 0 |
| ## 499 | 1 | 41.58 | 1.750 | 0.210 | 1 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## 500 | 0 | 57.08 | 0.335 | 1.000 | 1 | 1 | 0 | 0 | 252 | 2197 | 0 |
| ## 501 | 0 | 55.75 | 7.080 | 6.750 | 1 | 0 | 3 | 0 | 100 | 50 | 0 |
| ## 502 | 1 | 43.25 | 25.210 | 0.210 | 1 | 0 | 1 | 1 | 760 | 90 | 0 |
| ## 503 | 0 | 25.33 | 2.085 | 2.750 | 1 | 1 | 0 | 0 | 360 | 1 | 0 |
| ## 504 | 0 | 24.58 | 0.670 | 1.750 | 1 | 1 | 0 | 1 | 400 | 0 | 0 |
| ## 505 | 1 | 43.17 | 2.250 | 0.750 | 1 | 1 | 0 | 1 | 560 | 0 | 0 |
| ## 506 | 1 | 40.92 | 0.835 | 0.000 | 1 | 1 | 0 | 1 | 130 | 1 | 0 |
| ## 507 | 1 | 31.83 | 2.500 | 7.500 | 1 | 1 | 0 | 0 | 523 | 0 | 0 |
| ## 508 | 0 | 33.92 | 1.585 | 0.000 | 1 | 1 | 0 | 1 | 320 | 0 | 0 |
| ## 509 | 0 | 24.92 | 1.250 | 0.000 | 1 | 1 | 0 | 1 | 80 | 0 | 0 |
| ## 510 | 1 | 35.25 | 3.165 | 3.750 | 1 | 1 | 0 | 0 | 680 | 0 | 0 |
| ## 511 | 1 | 34.25 | 1.750 | 0.250 | 1 | 1 | 0 | 0 | 163 | 0 | 0 |
| ## 512 | 1 | 80.25 | 5.500 | 0.540 | 1 | 1 | 0 | 1 | 0 | 340 | 0 |
| ## 513 | 1 | 19.42 | 1.500 | 2.000 | 1 | 1 | 0 | 0 | 100 | 20 | 0 |
| ## 514 | 1 | 42.75 | 3.000 | 1.000 | 1 | 1 | 0 | 1 | 0 | 200 | 0 |
| ## 515 | 1 | 19.67 | 10.000 | 0.835 | 1 | 1 | 0 | 0 | 140 | 0 | 0 |
| ## 516 | 1 | 36.33 | 3.790 | 1.165 | 1 | 1 | 0 | 0 | 200 | 0 | 0 |
| ## 517 | 1 | 30.08 | 1.040 | 0.500 | 1 | 0 | 10 | 0 | 132 | 28 | 0 |
| ## 518 | 1 | 44.25 | 11.000 | 1.500 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 519 | 1 | 23.58 | 0.460 | 2.625 | 1 | 0 | 6 | 0 | 208 | 347 | 0 |
| ## 520 | 1 | 23.92 | 1.500 | 1.875 | 1 | 0 | 6 | 1 | 200 | 327 | 1 |
| ## 521 | 1 | 33.17 | 1.000 | 0.750 | 1 | 0 | 7 | 0 | 340 | 4071 | 1 |
| ## 522 | 1 | 48.33 | 12.000 | 16.000 | 1 | 1 | 0 | 1 | 110 | 0 | 1 |
| ## 523 | 1 | 76.75 | 22.290 | 12.750 | 1 | 0 | 1 | 0 | 0 | 109 | 1 |
| ## 524 | 1 | 51.33 | 10.000 | 0.000 | 1 | 0 | 11 | 1 | 0 | 1249 | 1 |
| ## 525 | 1 | 34.75 | 15.000 | 5.375 | 1 | 0 | 9 | 0 | 0 | 134 | 1 |
| ## 526 | 1 | 38.58 | 3.335 | 4.000 | 1 | 0 | 14 | 1 | 383 | 1344 | 1 |
| ## 527 | 0 | 22.42 | 11.250 | 0.750 | 1 | 0 | 4 | 1 | 0 | 321 | 1 |
| ## 528 | 1 | 41.92 | 0.420 | 0.210 | 1 | 0 | 6 | 1 | 220 | 948 | 1 |
| ## 529 | 1 | 29.58 | 4.500 | 7.500 | 1 | 0 | 2 | 0 | 330 | 0 | 1 |
| ## 530 | 0 | 32.17 | 1.460 | 1.085 | 1 | 0 | 16 | 1 | 120 | 2079 | 1 |
| ## 531 | 1 | 51.42 | 0.040 | 0.040 | 1 | 1 | 0 | 1 | 0 | 3000 | 1 |
| ## 532 | 0 | 22.83 | 2.290 | 2.290 | 1 | 0 | 7 | 0 | 140 | 2384 | 1 |
| ## 533 | 0 | 25.00 | 12.330 | 3.500 | 1 | 0 | 6 | 1 | 400 | 458 | 1 |
| ## 534 | 1 | 26.75 | 1.125 | 1.250 | 1 | 1 | 0 | 1 | 0 | 5298 | 1 |
| ## 535 | 1 | 23.33 | 1.500 | 1.415 | 1 | 1 | 0 | 1 | 422 | 200 | 1 |
| ## 536 | 1 | 24.42 | 12.335 | 1.585 | 1 | 1 | 0 | 0 | 120 | 0 | 1 |
| ## 537 | 1 | 42.17 | 5.040 | 12.750 | 1 | 1 | 0 | 0 | 92 | 0 | 1 |
| ## 538 | 0 | 20.83 | 3.000 | 0.040 | 1 | 1 | 0 | 1 | 100 | 0 | 1 |
| ## 539 | 1 | 23.08 | 11.500 | 2.125 | 1 | 0 | 11 | 0 | 290 | 284 | 1 |
| ## 540 | 0 | 25.17 | 2.875 | 0.875 | 1 | 1 | 0 | 1 | 360 | 0 | 1 |
| ## 541 | 1 | 43.08 | 0.375 | 0.375 | 1 | 0 | 8 | 0 | 300 | 162 | 1 |
| ## 542 | 0 | 35.75 | 0.915 | 0.750 | 1 | 0 | 4 | 1 | 0 | 1583 | 1 |
| ## 543 | 1 | 59.50 | 2.750 | 1.750 | 1 | 0 | 5 | 0 | 60 | 58 | 1 |
| ## 544 | 1 | 21.00 | 3.000 | 1.085 | 1 | 0 | 8 | 0 | 160 | 1 | 1 |
| ## 545 | 1 | 21.92 | 0.540 | 0.040 | 1 | 0 | 1 | 0 | 840 | 59 | 1 |
| ## 546 | 0 | 65.17 | 14.000 | 0.000 | 1 | 0 | 11 | 0 | 0 | 1400 | 1 |
| ## 547 | 0 | 20.33 | 10.000 | 1.000 | 1 | 0 | 4 | 1 | 50 | 1465 | 1 |
| ## 548 | 1 | 32.25 | 0.165 | 3.250 | 1 | 0 | 1 | 0 | 432 | 8000 | 1 |
| ## 549 | 1 | 30.17 | 0.500 | 1.750 | 1 | 0 | 11 | 1 | 32 | 540 | 1 |

| | | | | | | | | | | | | |
|----|-----|---|-------|--------|--------|---|---|----|---|-----|-------|---|
| ## | 550 | 1 | 25.17 | 6.000 | 1.000 | 1 | 0 | 3 | 1 | 0 | 0 | 1 |
| ## | 551 | 1 | 39.17 | 1.625 | 1.500 | 1 | 0 | 10 | 1 | 186 | 4700 | 1 |
| ## | 552 | 1 | 39.08 | 6.000 | 1.290 | 1 | 0 | 5 | 0 | 108 | 1097 | 1 |
| ## | 553 | 1 | 31.67 | 0.830 | 1.335 | 1 | 0 | 8 | 0 | 303 | 3290 | 1 |
| ## | 554 | 1 | 41.00 | 0.040 | 0.040 | 0 | 0 | 1 | 1 | 560 | 0 | 1 |
| ## | 555 | 1 | 48.50 | 4.250 | 0.125 | 1 | 1 | 0 | 0 | 225 | 0 | 1 |
| ## | 556 | 1 | 32.67 | 9.000 | 5.250 | 1 | 1 | 0 | 0 | 154 | 0 | 1 |
| ## | 557 | 0 | 28.08 | 15.000 | 0.000 | 1 | 1 | 0 | 1 | 0 | 13212 | 1 |
| ## | 558 | 1 | 73.42 | 17.750 | 0.000 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## | 559 | 1 | 64.08 | 20.000 | 17.500 | 1 | 0 | 9 | 0 | 0 | 1000 | 1 |
| ## | 560 | 1 | 51.58 | 15.000 | 8.500 | 1 | 0 | 9 | 1 | 0 | 0 | 1 |
| ## | 561 | 1 | 26.67 | 1.750 | 1.000 | 1 | 0 | 5 | 0 | 160 | 5777 | 1 |
| ## | 562 | 1 | 25.33 | 0.580 | 0.290 | 1 | 0 | 7 | 0 | 96 | 5124 | 1 |
| ## | 563 | 1 | 30.17 | 6.500 | 3.125 | 1 | 0 | 8 | 1 | 330 | 1200 | 1 |
| ## | 564 | 1 | 27.00 | 0.750 | 4.250 | 1 | 0 | 3 | 0 | 312 | 150 | 1 |
| ## | 565 | 1 | 34.17 | 5.250 | 0.085 | 0 | 1 | 0 | 0 | 290 | 6 | 1 |
| ## | 566 | 1 | 38.67 | 0.210 | 0.085 | 1 | 1 | 0 | 0 | 280 | 0 | 1 |
| ## | 567 | 1 | 25.75 | 0.750 | 0.250 | 1 | 1 | 0 | 1 | 349 | 23 | 1 |
| ## | 568 | 0 | 46.08 | 3.000 | 2.375 | 1 | 0 | 8 | 0 | 396 | 4159 | 1 |
| ## | 569 | 0 | 21.50 | 6.000 | 2.500 | 1 | 0 | 3 | 1 | 80 | 918 | 1 |
| ## | 570 | 1 | 20.50 | 2.415 | 2.000 | 1 | 0 | 11 | 0 | 200 | 3000 | 1 |
| ## | 571 | 0 | 29.50 | 0.460 | 0.540 | 1 | 0 | 4 | 1 | 380 | 500 | 1 |
| ## | 572 | 1 | 29.83 | 1.250 | 0.250 | 0 | 1 | 0 | 1 | 224 | 0 | 0 |
| ## | 573 | 1 | 20.08 | 0.250 | 0.125 | 0 | 1 | 0 | 1 | 200 | 0 | 0 |
| ## | 574 | 1 | 23.42 | 0.585 | 0.085 | 1 | 1 | 0 | 1 | 180 | 0 | 0 |
| ## | 575 | 0 | 29.58 | 1.750 | 1.250 | 0 | 1 | 0 | 0 | 280 | 0 | 0 |
| ## | 576 | 1 | 16.17 | 0.040 | 0.040 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| ## | 577 | 1 | 32.33 | 3.500 | 0.500 | 0 | 1 | 0 | 0 | 232 | 0 | 0 |
| ## | 578 | 1 | 47.83 | 4.165 | 0.085 | 0 | 1 | 0 | 0 | 520 | 0 | 0 |
| ## | 579 | 1 | 20.00 | 1.250 | 0.125 | 0 | 1 | 0 | 1 | 140 | 4 | 0 |
| ## | 580 | 1 | 27.58 | 3.250 | 5.085 | 0 | 0 | 2 | 0 | 369 | 1 | 0 |
| ## | 581 | 1 | 22.00 | 0.790 | 0.290 | 0 | 0 | 1 | 1 | 420 | 283 | 0 |
| ## | 582 | 1 | 19.33 | 10.915 | 0.585 | 0 | 0 | 2 | 0 | 200 | 7 | 0 |
| ## | 583 | 0 | 38.33 | 4.415 | 0.125 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 584 | 1 | 29.42 | 1.250 | 0.250 | 0 | 0 | 2 | 0 | 400 | 108 | 0 |
| ## | 585 | 1 | 22.67 | 0.750 | 1.585 | 0 | 0 | 1 | 0 | 400 | 9 | 0 |
| ## | 586 | 1 | 32.25 | 14.000 | 0.000 | 0 | 0 | 2 | 1 | 160 | 1 | 0 |
| ## | 587 | 1 | 29.58 | 4.750 | 2.000 | 0 | 0 | 1 | 0 | 460 | 68 | 0 |
| ## | 588 | 1 | 18.42 | 10.415 | 0.125 | 1 | 1 | 0 | 1 | 120 | 375 | 0 |
| ## | 589 | 1 | 22.17 | 2.250 | 0.125 | 0 | 1 | 0 | 1 | 160 | 10 | 0 |
| ## | 590 | 1 | 22.67 | 0.165 | 2.250 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| ## | 591 | 1 | 18.83 | 0.000 | 0.665 | 0 | 1 | 0 | 1 | 160 | 1 | 0 |
| ## | 592 | 1 | 21.58 | 0.790 | 0.665 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## | 593 | 1 | 23.75 | 12.000 | 2.085 | 0 | 1 | 0 | 1 | 80 | 0 | 0 |
| ## | 594 | 1 | 36.08 | 2.540 | 0.000 | 0 | 1 | 0 | 1 | 0 | 1000 | 0 |
| ## | 595 | 1 | 29.25 | 13.000 | 0.500 | 0 | 1 | 0 | 1 | 228 | 0 | 0 |
| ## | 596 | 0 | 19.58 | 0.665 | 1.665 | 0 | 1 | 0 | 1 | 220 | 5 | 0 |
| ## | 597 | 0 | 22.92 | 1.250 | 0.250 | 0 | 1 | 0 | 0 | 120 | 809 | 0 |
| ## | 598 | 0 | 27.25 | 0.290 | 0.125 | 0 | 0 | 1 | 0 | 272 | 108 | 0 |
| ## | 599 | 0 | 38.75 | 1.500 | 0.000 | 0 | 1 | 0 | 1 | 76 | 0 | 0 |
| ## | 600 | 1 | 32.42 | 2.165 | 0.000 | 0 | 1 | 0 | 1 | 120 | 0 | 0 |
| ## | 601 | 0 | 23.75 | 0.710 | 0.250 | 0 | 0 | 1 | 0 | 240 | 4 | 0 |
| ## | 602 | 1 | 18.17 | 2.460 | 0.960 | 0 | 0 | 2 | 0 | 160 | 587 | 0 |
| ## | 603 | 1 | 40.92 | 0.500 | 0.500 | 0 | 1 | 0 | 0 | 130 | 0 | 0 |

| | | | | | | | | | | | |
|--------|---|-------|--------|-------|---|---|----|---|-----|-----|---|
| ## 604 | 1 | 19.50 | 9.585 | 0.790 | 0 | 1 | 0 | 1 | 80 | 350 | 0 |
| ## 605 | 1 | 28.58 | 3.625 | 0.250 | 0 | 1 | 0 | 0 | 100 | 0 | 0 |
| ## 606 | 1 | 35.58 | 0.750 | 1.500 | 0 | 1 | 0 | 0 | 231 | 0 | 0 |
| ## 607 | 1 | 34.17 | 2.750 | 2.500 | 0 | 1 | 0 | 0 | 232 | 200 | 0 |
| ## 608 | 1 | 31.58 | 0.750 | 3.500 | 0 | 1 | 0 | 0 | 320 | 0 | 0 |
| ## 609 | 0 | 52.50 | 7.000 | 3.000 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 610 | 1 | 36.17 | 0.420 | 0.290 | 0 | 1 | 0 | 0 | 309 | 2 | 0 |
| ## 611 | 1 | 37.33 | 2.665 | 0.165 | 0 | 1 | 0 | 0 | 0 | 501 | 0 |
| ## 612 | 0 | 20.83 | 8.500 | 0.165 | 0 | 1 | 0 | 1 | 0 | 351 | 0 |
| ## 613 | 1 | 24.08 | 9.000 | 0.250 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ## 614 | 1 | 25.58 | 0.335 | 3.500 | 0 | 1 | 0 | 0 | 340 | 0 | 0 |
| ## 615 | 0 | 35.17 | 3.750 | 0.000 | 0 | 0 | 6 | 1 | 0 | 200 | 0 |
| ## 616 | 1 | 48.08 | 3.750 | 1.000 | 0 | 1 | 0 | 1 | 100 | 2 | 0 |
| ## 617 | 0 | 15.83 | 7.625 | 0.125 | 0 | 0 | 1 | 0 | 0 | 160 | 0 |
| ## 618 | 0 | 22.50 | 0.415 | 0.335 | 0 | 1 | 0 | 0 | 144 | 0 | 0 |
| ## 619 | 1 | 21.50 | 11.500 | 0.500 | 1 | 1 | 0 | 0 | 100 | 68 | 0 |
| ## 620 | 0 | 23.58 | 0.830 | 0.415 | 0 | 0 | 1 | 0 | 200 | 11 | 0 |
| ## 621 | 0 | 21.08 | 5.000 | 0.000 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 622 | 1 | 25.67 | 3.250 | 2.290 | 0 | 0 | 1 | 0 | 416 | 21 | 0 |
| ## 623 | 0 | 38.92 | 1.665 | 0.250 | 0 | 1 | 0 | 1 | 0 | 390 | 0 |
| ## 624 | 0 | 15.75 | 0.375 | 1.000 | 0 | 1 | 0 | 1 | 120 | 18 | 0 |
| ## 625 | 0 | 28.58 | 3.750 | 0.250 | 0 | 0 | 1 | 0 | 40 | 154 | 0 |
| ## 626 | 1 | 22.25 | 9.000 | 0.085 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 627 | 1 | 29.83 | 3.500 | 0.165 | 0 | 1 | 0 | 1 | 216 | 0 | 0 |
| ## 628 | 0 | 23.50 | 1.500 | 0.875 | 0 | 1 | 0 | 0 | 160 | 0 | 0 |
| ## 629 | 1 | 32.08 | 4.000 | 1.500 | 0 | 1 | 0 | 0 | 120 | 0 | 0 |
| ## 630 | 1 | 31.08 | 1.500 | 0.040 | 0 | 1 | 0 | 1 | 160 | 0 | 0 |
| ## 631 | 1 | 31.83 | 0.040 | 0.040 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 632 | 0 | 21.75 | 11.750 | 0.250 | 0 | 1 | 0 | 0 | 180 | 0 | 0 |
| ## 633 | 0 | 17.92 | 0.540 | 1.750 | 0 | 0 | 1 | 0 | 80 | 5 | 0 |
| ## 634 | 1 | 30.33 | 0.500 | 0.085 | 0 | 1 | 0 | 0 | 252 | 0 | 0 |
| ## 635 | 1 | 51.83 | 2.040 | 1.500 | 0 | 1 | 0 | 1 | 120 | 1 | 0 |
| ## 636 | 1 | 47.17 | 5.835 | 5.500 | 0 | 1 | 0 | 1 | 465 | 150 | 0 |
| ## 637 | 1 | 25.83 | 12.835 | 0.500 | 0 | 1 | 0 | 1 | 0 | 2 | 0 |
| ## 638 | 0 | 50.25 | 0.835 | 0.500 | 0 | 1 | 0 | 0 | 240 | 117 | 0 |
| ## 639 | 0 | 37.33 | 2.500 | 0.210 | 0 | 1 | 0 | 1 | 260 | 246 | 0 |
| ## 640 | 0 | 41.58 | 1.040 | 0.665 | 0 | 1 | 0 | 1 | 240 | 237 | 0 |
| ## 641 | 0 | 30.58 | 10.665 | 0.085 | 0 | 0 | 12 | 0 | 129 | 3 | 0 |
| ## 642 | 1 | 19.42 | 7.250 | 0.040 | 0 | 0 | 1 | 1 | 100 | 1 | 0 |
| ## 643 | 0 | 17.92 | 10.210 | 0.000 | 0 | 1 | 0 | 1 | 0 | 50 | 0 |
| ## 644 | 0 | 20.08 | 1.250 | 0.000 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| ## 645 | 1 | 19.50 | 0.290 | 0.290 | 0 | 1 | 0 | 1 | 280 | 364 | 0 |
| ## 646 | 1 | 27.83 | 1.000 | 3.000 | 0 | 1 | 0 | 1 | 176 | 537 | 0 |
| ## 647 | 1 | 17.08 | 3.290 | 0.335 | 0 | 1 | 0 | 0 | 140 | 2 | 0 |
| ## 648 | 1 | 36.42 | 0.750 | 0.585 | 0 | 1 | 0 | 1 | 240 | 3 | 0 |
| ## 649 | 1 | 40.58 | 3.290 | 3.500 | 0 | 1 | 0 | 0 | 400 | 0 | 0 |
| ## 650 | 1 | 21.08 | 10.085 | 1.250 | 0 | 1 | 0 | 1 | 260 | 0 | 0 |
| ## 651 | 0 | 22.67 | 0.750 | 2.000 | 0 | 0 | 2 | 0 | 200 | 394 | 0 |
| ## 652 | 0 | 25.25 | 13.500 | 2.000 | 0 | 0 | 1 | 0 | 200 | 1 | 0 |
| ## 653 | 1 | 17.92 | 0.205 | 0.040 | 0 | 1 | 0 | 1 | 280 | 750 | 0 |
| ## 654 | 1 | 35.00 | 3.375 | 8.290 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

Question 2.2.1 SVM Model

[illegible]

```
## [1] "( -0.00100653481057611 * V1) + ( -0.00117290480611665 * V2) + ( -0.00162619672236963 * V3) +
```

Question 2.2.2 rbf Model & polydot Model

```
# call svm using rbfdot, which is a radius basis kernel "Gaussian"
```

```
rbf_model <- ksvm(as.matrix(data[,1:10]),as.factor(data[,11]),type='C-svc', kernel="rbfdot", C=100,scal
rbf_model
```

```
## Support Vector Machine object of class "ksvm"
```

##

```
## SV type: C-svc (classification)
```

```
## parameter : cost C = 100
```

##

```
## Gaussian Radial Basis kernel function.
```

```
## Hyperparameter : sigma = 0.0843674928566142
```

##

```
## Number of Support Vectors : 243
```

##

```
## Objective Function Value : -9624.211
```

```
## Training error : 0.050459
```

```
# calculate a1...am for rbfdot model
```

```
a1_rbf <- colSums(rbf_model@xmatrix[[1]] * rbf_model@coef[[1]])
```

a1_rbf

| | | | | | | | |
|----|------------|------------|-----------|-----------|-----------|------------|----------|
| ## | V1 | V2 | V3 | V4 | V5 | V6 | V7 |
| ## | -19.252608 | -40.705560 | -9.022849 | 58.749966 | 48.005158 | -20.700364 | 7.677803 |
| ## | V8 | V9 | V10 | | | | |
| ## | -23.072898 | -58.672921 | 48.064617 | | | | |

```
# calculate a0 for rbfdot model
```

```
a0_rbf <- -rbf_model@b
```

a0 rbf

```
## [1] 0.9032142
```

```
# see what the rbfdot model predicts
```

```
rbfdot_pred <- predict(rbf_model,data[,1:10])
```

rbfdot_pred

[illegible]

```
# see what fraction of the model's predictions match the actual classification
# --> gives out a HIGH estimate of accuracy rate of 95.26%
sum(rbfdot_pred == data[,11]) / nrow(data)
```

```
# call svm using polydot, which is a polynomial kernel
polydot_model <- ksvm(as.matrix(data[,1:10]),as.factor(data[,11]),type='C-svc', kernel="polydot")
```

polydot_model

```
# calculate a1...am for polydot model
a1_polydot <- colSums(polydot_model@xmatrix[[1]] * polydot_model@coef[[1]])
a1_polydot
```

```
# calculate a0 for polydot model
a0_polydot <- -polydot_model@b
a0_polydot
```

```
# see what the polydot model predicts
polydot_pred <- predict(polydot_model,data[,1:10])
polydot_pred
```

16


```
## [371] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [408] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [445] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [556] 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
## [593] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
## [630] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## Levels: 0 1
```

```
# see what fraction of the model's predictions match the actual classification
# --> gives out an estimate of accuracy rate of 86.39%
sum(polydot_pred == data[,11]) / nrow(data)
```

```
## [1] 0.8639144
```

Question 3

Code Referenced from StackOverflow topic ("How to predict in kkn function? library(kknn)") by vcai01

```
accuracy <- array(0, 20)
# loop through k values
for (k_val in 1:20) {
  # use array to set a predictor including all data points
  predictor <- array(0, (nrow(data)))
  # loop through data points to check how well the classification are for each
  for (i in 1:nrow(data)) {
    # data[-i, ] is the data predictors without current i (training)
    train_data <- data[-i, ]
    # data[i, ] is the data predictors with current i (validation)
    validation_data <- data[i, ]
    # V11~. means we are using all variables other than V11(the binary response variable) for model for
    knn_model <- kknn(formula = V11~., train = train_data, test = validation_data, kernel = "optimal", l
    # add to predictor the predicted vals from the model and round to 1 or 0 to be compared to with dat
    predictor[i] <- round(predict(knn_model), 0)
  }
  # check to see how accurate predictor is to actual response
  accuracy[k_val] <- sum(predictor == data[, 11])/nrow(data)
}

# loop through i to print out accuracy rate for each k value
for (i in 1:length(accuracy)) {
  outputstr = paste("Value of k at ", i, " has ", round(accuracy[i]*100, 5), "% Accuracy", sep = " " )
  print(outputstr)
}
```

```
## [1] "Value of k at 1 has 81.49847% Accuracy"
## [1] "Value of k at 2 has 81.49847% Accuracy"
## [1] "Value of k at 3 has 81.49847% Accuracy"
## [1] "Value of k at 4 has 81.49847% Accuracy"
## [1] "Value of k at 5 has 85.1682% Accuracy"
## [1] "Value of k at 6 has 84.55657% Accuracy"
## [1] "Value of k at 7 has 84.70948% Accuracy"
## [1] "Value of k at 8 has 84.86239% Accuracy"
## [1] "Value of k at 9 has 84.70948% Accuracy"
## [1] "Value of k at 10 has 85.01529% Accuracy"
```

```

## [1] "Value of k at 11 has 85.1682% Accuracy"
## [1] "Value of k at 12 has 85.3211% Accuracy"
## [1] "Value of k at 13 has 85.1682% Accuracy"
## [1] "Value of k at 14 has 85.1682% Accuracy"
## [1] "Value of k at 15 has 85.3211% Accuracy"
## [1] "Value of k at 16 has 85.1682% Accuracy"
## [1] "Value of k at 17 has 85.1682% Accuracy"
## [1] "Value of k at 18 has 85.1682% Accuracy"
## [1] "Value of k at 19 has 85.01529% Accuracy"
## [1] "Value of k at 20 has 85.01529% Accuracy"

# summarize to get our best k value
bestacc = paste("The optimal accuracy for classifying data points in the full data set is ", round(max(
print(bestacc)

## [1] "The optimal accuracy for classifying data points in the full data set is 85.3211% at a value of

```