2.10

Sai Ananthula - emw832

```
library("ISLR2")
```

```
Boston
```

```
##        crim   zn indus chas    nox    rm   age     dis rad tax ptratio lstat
## 1   0.00632 18.0  2.31    0 0.5380 6.575  65.2 4.0900   1 296    15.3  4.98
## 2   0.02731  0.0  7.07    0 0.4690 6.421  78.9 4.9671   2 242    17.8  9.14
## 3   0.02729  0.0  7.07    0 0.4690 7.185  61.1 4.9671   2 242    17.8  4.03
## 4   0.03237  0.0  2.18    0 0.4580 6.998  45.8 6.0622   3 222    18.7  2.94
## 5   0.06905  0.0  2.18    0 0.4580 7.147  54.2 6.0622   3 222    18.7  5.33
## 6   0.02985  0.0  2.18    0 0.4580 6.430  58.7 6.0622   3 222    18.7  5.21
## 7   0.08829 12.5  7.87    0 0.5240 6.012  66.6 5.5605   5 311    15.2 12.43
## 8   0.14455 12.5  7.87    0 0.5240 6.172  96.1 5.9505   5 311    15.2 19.15
## 9   0.21124 12.5  7.87    0 0.5240 5.631 100.0 6.0821   5 311    15.2 29.93
## 10  0.17004 12.5  7.87    0 0.5240 6.004  85.9 6.5921   5 311    15.2 17.10
## 11  0.22489 12.5  7.87    0 0.5240 6.377  94.3 6.3467   5 311    15.2 20.45
## 12  0.11747 12.5  7.87    0 0.5240 6.009  82.9 6.2267   5 311    15.2 13.27
## 13  0.09378 12.5  7.87    0 0.5240 5.889  39.0 5.4509   5 311    15.2 15.71
## 14  0.62976  0.0  8.14    0 0.5380 5.949  61.8 4.7075   4 307    21.0  8.26
## 15  0.63796  0.0  8.14    0 0.5380 6.096  84.5 4.4619   4 307    21.0 10.26
## 16  0.62739  0.0  8.14    0 0.5380 5.834  56.5 4.4986   4 307    21.0  8.47
## 17  1.05393  0.0  8.14    0 0.5380 5.935  29.3 4.4986   4 307    21.0  6.58
## 18  0.78420  0.0  8.14    0 0.5380 5.990  81.7 4.2579   4 307    21.0 14.67
## 19  0.80271  0.0  8.14    0 0.5380 5.456  36.6 3.7965   4 307    21.0 11.69
## 20  0.72580  0.0  8.14    0 0.5380 5.727  69.5 3.7965   4 307    21.0 11.28
## 21  1.25179  0.0  8.14    0 0.5380 5.570  98.1 3.7979   4 307    21.0 21.02
## 22  0.85204  0.0  8.14    0 0.5380 5.965  89.2 4.0123   4 307    21.0 13.83
## 23  1.23247  0.0  8.14    0 0.5380 6.142  91.7 3.9769   4 307    21.0 18.72
## 24  0.98843  0.0  8.14    0 0.5380 5.813 100.0 4.0952   4 307    21.0 19.88
## 25  0.75026  0.0  8.14    0 0.5380 5.924  94.1 4.3996   4 307    21.0 16.30
## 26  0.84054  0.0  8.14    0 0.5380 5.599  85.7 4.4546   4 307    21.0 16.51
## 27  0.67191  0.0  8.14    0 0.5380 5.813  90.3 4.6820   4 307    21.0 14.81
## 28  0.95577  0.0  8.14    0 0.5380 6.047  88.8 4.4534   4 307    21.0 17.28
## 29  0.77299  0.0  8.14    0 0.5380 6.495  94.4 4.4547   4 307    21.0 12.80
## 30  1.00245  0.0  8.14    0 0.5380 6.674  87.3 4.2390   4 307    21.0 11.98
## 31  1.13081  0.0  8.14    0 0.5380 5.713  94.1 4.2330   4 307    21.0 22.60
## 32  1.35472  0.0  8.14    0 0.5380 6.072 100.0 4.1750   4 307    21.0 13.04
## 33  1.38799  0.0  8.14    0 0.5380 5.950  82.0 3.9900   4 307    21.0 27.71
## 34  1.15172  0.0  8.14    0 0.5380 5.701  95.0 3.7872   4 307    21.0 18.35
## 35  1.61282  0.0  8.14    0 0.5380 6.096  96.9 3.7598   4 307    21.0 20.34
## 36  0.06417  0.0  5.96    0 0.4990 5.933  68.2 3.3603   5 279    19.2  9.68
## 37  0.09744  0.0  5.96    0 0.4990 5.841  61.4 3.3779   5 279    19.2 11.41
## 38  0.08014  0.0  5.96    0 0.4990 5.850  41.5 3.9342   5 279    19.2  8.77
## 39  0.17505  0.0  5.96    0 0.4990 5.966  30.2 3.8473   5 279    19.2 10.13
```

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## 40  0.02763  75.0   2.95   0 0.4280 6.595  21.8  5.4011  3 252  18.3  4.32
## 41  0.03359  75.0   2.95   0 0.4280 7.024  15.8  5.4011  3 252  18.3  1.98
## 42  0.12744   0.0   6.91   0 0.4480 6.770   2.9  5.7209  3 233  17.9  4.84
## 43  0.14150   0.0   6.91   0 0.4480 6.169   6.6  5.7209  3 233  17.9  5.81
## 44  0.15936   0.0   6.91   0 0.4480 6.211   6.5  5.7209  3 233  17.9  7.44
## 45  0.12269   0.0   6.91   0 0.4480 6.069  40.0  5.7209  3 233  17.9  9.55
## 46  0.17142   0.0   6.91   0 0.4480 5.682  33.8  5.1004  3 233  17.9 10.21
## 47  0.18836   0.0   6.91   0 0.4480 5.786  33.3  5.1004  3 233  17.9 14.15
## 48  0.22927   0.0   6.91   0 0.4480 6.030  85.5  5.6894  3 233  17.9 18.80
## 49  0.25387   0.0   6.91   0 0.4480 5.399  95.3  5.8700  3 233  17.9 30.81
## 50  0.21977   0.0   6.91   0 0.4480 5.602  62.0  6.0877  3 233  17.9 16.20
## 51  0.08873  21.0   5.64   0 0.4390 5.963  45.7  6.8147  4 243  16.8 13.45
## 52  0.04337  21.0   5.64   0 0.4390 6.115  63.0  6.8147  4 243  16.8  9.43
## 53  0.05360  21.0   5.64   0 0.4390 6.511  21.1  6.8147  4 243  16.8  5.28
## 54  0.04981  21.0   5.64   0 0.4390 5.998  21.4  6.8147  4 243  16.8  8.43
## 55  0.01360  75.0   4.00   0 0.4100 5.888  47.6  7.3197  3 469  21.1 14.80
## 56  0.01311  90.0   1.22   0 0.4030 7.249  21.9  8.6966  5 226  17.9  4.81
## 57  0.02055  85.0   0.74   0 0.4100 6.383  35.7  9.1876  2 313  17.3  5.77
## 58  0.01432 100.0   1.32   0 0.4110 6.816  40.5  8.3248  5 256  15.1  3.95
## 59  0.15445  25.0   5.13   0 0.4530 6.145  29.2  7.8148  8 284  19.7  6.86
## 60  0.10328  25.0   5.13   0 0.4530 5.927  47.2  6.9320  8 284  19.7  9.22
## 61  0.14932  25.0   5.13   0 0.4530 5.741  66.2  7.2254  8 284  19.7 13.15
## 62  0.17171  25.0   5.13   0 0.4530 5.966  93.4  6.8185  8 284  19.7 14.44
## 63  0.11027  25.0   5.13   0 0.4530 6.456  67.8  7.2255  8 284  19.7  6.73
## 64  0.12650  25.0   5.13   0 0.4530 6.762  43.4  7.9809  8 284  19.7  9.50
## 65  0.01951  17.5   1.38   0 0.4161 7.104  59.5  9.2229  3 216  18.6  8.05
## 66  0.03584  80.0   3.37   0 0.3980 6.290  17.8  6.6115  4 337  16.1  4.67
## 67  0.04379  80.0   3.37   0 0.3980 5.787  31.1  6.6115  4 337  16.1 10.24
## 68  0.05789  12.5   6.07   0 0.4090 5.878  21.4  6.4980  4 345  18.9  8.10
## 69  0.13554  12.5   6.07   0 0.4090 5.594  36.8  6.4980  4 345  18.9 13.09
## 70  0.12816  12.5   6.07   0 0.4090 5.885  33.0  6.4980  4 345  18.9  8.79
## 71  0.08826   0.0  10.81   0 0.4130 6.417   6.6  5.2873  4 305  19.2  6.72
## 72  0.15876   0.0  10.81   0 0.4130 5.961  17.5  5.2873  4 305  19.2  9.88
## 73  0.09164   0.0  10.81   0 0.4130 6.065   7.8  5.2873  4 305  19.2  5.52
## 74  0.19539   0.0  10.81   0 0.4130 6.245   6.2  5.2873  4 305  19.2  7.54
## 75  0.07896   0.0  12.83   0 0.4370 6.273   6.0  4.2515  5 398  18.7  6.78
## 76  0.09512   0.0  12.83   0 0.4370 6.286  45.0  4.5026  5 398  18.7  8.94
## 77  0.10153   0.0  12.83   0 0.4370 6.279  74.5  4.0522  5 398  18.7 11.97
## 78  0.08707   0.0  12.83   0 0.4370 6.140  45.8  4.0905  5 398  18.7 10.27
## 79  0.05646   0.0  12.83   0 0.4370 6.232  53.7  5.0141  5 398  18.7 12.34
## 80  0.08387   0.0  12.83   0 0.4370 5.874  36.6  4.5026  5 398  18.7  9.10
## 81  0.04113  25.0   4.86   0 0.4260 6.727  33.5  5.4007  4 281  19.0  5.29
## 82  0.04462  25.0   4.86   0 0.4260 6.619  70.4  5.4007  4 281  19.0  7.22
## 83  0.03659  25.0   4.86   0 0.4260 6.302  32.2  5.4007  4 281  19.0  6.72
## 84  0.03551  25.0   4.86   0 0.4260 6.167  46.7  5.4007  4 281  19.0  7.51
## 85  0.05059   0.0   4.49   0 0.4490 6.389  48.0  4.7794  3 247  18.5  9.62
## 86  0.05735   0.0   4.49   0 0.4490 6.630  56.1  4.4377  3 247  18.5  6.53
## 87  0.05188   0.0   4.49   0 0.4490 6.015  45.1  4.4272  3 247  18.5 12.86
## 88  0.07151   0.0   4.49   0 0.4490 6.121  56.8  3.7476  3 247  18.5  8.44
## 89  0.05660   0.0   3.41   0 0.4890 7.007  86.3  3.4217  2 270  17.8  5.50
## 90  0.05302   0.0   3.41   0 0.4890 7.079  63.1  3.4145  2 270  17.8  5.70
## 91  0.04684   0.0   3.41   0 0.4890 6.417  66.1  3.0923  2 270  17.8  8.81
## 92  0.03932   0.0   3.41   0 0.4890 6.405  73.9  3.0921  2 270  17.8  8.20
## 93  0.04203  28.0  15.04   0 0.4640 6.442  53.6  3.6659  4 270  18.2  8.16
```

```
## 94  0.02875 28.0 15.04  0 0.4640 6.211  28.9 3.6659  4 270  18.2  6.21
## 95  0.04294 28.0 15.04  0 0.4640 6.249  77.3 3.6150  4 270  18.2 10.59
## 96  0.12204  0.0  2.89  0 0.4450 6.625  57.8 3.4952  2 276  18.0  6.65
## 97  0.11504  0.0  2.89  0 0.4450 6.163  69.6 3.4952  2 276  18.0 11.34
## 98  0.12083  0.0  2.89  0 0.4450 8.069  76.0 3.4952  2 276  18.0  4.21
## 99  0.08187  0.0  2.89  0 0.4450 7.820  36.9 3.4952  2 276  18.0  3.57
## 100 0.06860  0.0  2.89  0 0.4450 7.416  62.5 3.4952  2 276  18.0  6.19
## 101 0.14866  0.0  8.56  0 0.5200 6.727  79.9 2.7778  5 384  20.9  9.42
## 102 0.11432  0.0  8.56  0 0.5200 6.781  71.3 2.8561  5 384  20.9  7.67
## 103 0.22876  0.0  8.56  0 0.5200 6.405  85.4 2.7147  5 384  20.9 10.63
## 104 0.21161  0.0  8.56  0 0.5200 6.137  87.4 2.7147  5 384  20.9 13.44
## 105 0.13960  0.0  8.56  0 0.5200 6.167  90.0 2.4210  5 384  20.9 12.33
## 106 0.13262  0.0  8.56  0 0.5200 5.851  96.7 2.1069  5 384  20.9 16.47
## 107 0.17120  0.0  8.56  0 0.5200 5.836  91.9 2.2110  5 384  20.9 18.66
## 108 0.13117  0.0  8.56  0 0.5200 6.127  85.2 2.1224  5 384  20.9 14.09
## 109 0.12802  0.0  8.56  0 0.5200 6.474  97.1 2.4329  5 384  20.9 12.27
## 110 0.26363  0.0  8.56  0 0.5200 6.229  91.2 2.5451  5 384  20.9 15.55
## 111 0.10793  0.0  8.56  0 0.5200 6.195  54.4 2.7778  5 384  20.9 13.00
## 112 0.10084  0.0 10.01  0 0.5470 6.715  81.6 2.6775  6 432  17.8 10.16
## 113 0.12329  0.0 10.01  0 0.5470 5.913  92.9 2.3534  6 432  17.8 16.21
## 114 0.22212  0.0 10.01  0 0.5470 6.092  95.4 2.5480  6 432  17.8 17.09
## 115 0.14231  0.0 10.01  0 0.5470 6.254  84.2 2.2565  6 432  17.8 10.45
## 116 0.17134  0.0 10.01  0 0.5470 5.928  88.2 2.4631  6 432  17.8 15.76
## 117 0.13158  0.0 10.01  0 0.5470 6.176  72.5 2.7301  6 432  17.8 12.04
## 118 0.15098  0.0 10.01  0 0.5470 6.021  82.6 2.7474  6 432  17.8 10.30
## 119 0.13058  0.0 10.01  0 0.5470 5.872  73.1 2.4775  6 432  17.8 15.37
## 120 0.14476  0.0 10.01  0 0.5470 5.731  65.2 2.7592  6 432  17.8 13.61
## 121 0.06899  0.0 25.65  0 0.5810 5.870  69.7 2.2577  2 188  19.1 14.37
## 122 0.07165  0.0 25.65  0 0.5810 6.004  84.1 2.1974  2 188  19.1 14.27
## 123 0.09299  0.0 25.65  0 0.5810 5.961  92.9 2.0869  2 188  19.1 17.93
## 124 0.15038  0.0 25.65  0 0.5810 5.856  97.0 1.9444  2 188  19.1 25.41
## 125 0.09849  0.0 25.65  0 0.5810 5.879  95.8 2.0063  2 188  19.1 17.58
## 126 0.16902  0.0 25.65  0 0.5810 5.986  88.4 1.9929  2 188  19.1 14.81
## 127 0.38735  0.0 25.65  0 0.5810 5.613  95.6 1.7572  2 188  19.1 27.26
## 128 0.25915  0.0 21.89  0 0.6240 5.693  96.0 1.7883  4 437  21.2 17.19
## 129 0.32543  0.0 21.89  0 0.6240 6.431  98.8 1.8125  4 437  21.2 15.39
## 130 0.88125  0.0 21.89  0 0.6240 5.637  94.7 1.9799  4 437  21.2 18.34
## 131 0.34006  0.0 21.89  0 0.6240 6.458  98.9 2.1185  4 437  21.2 12.60
## 132 1.19294  0.0 21.89  0 0.6240 6.326  97.7 2.2710  4 437  21.2 12.26
## 133 0.59005  0.0 21.89  0 0.6240 6.372  97.9 2.3274  4 437  21.2 11.12
## 134 0.32982  0.0 21.89  0 0.6240 5.822  95.4 2.4699  4 437  21.2 15.03
## 135 0.97617  0.0 21.89  0 0.6240 5.757  98.4 2.3460  4 437  21.2 17.31
## 136 0.55778  0.0 21.89  0 0.6240 6.335  98.2 2.1107  4 437  21.2 16.96
## 137 0.32264  0.0 21.89  0 0.6240 5.942  93.5 1.9669  4 437  21.2 16.90
## 138 0.35233  0.0 21.89  0 0.6240 6.454  98.4 1.8498  4 437  21.2 14.59
## 139 0.24980  0.0 21.89  0 0.6240 5.857  98.2 1.6686  4 437  21.2 21.32
## 140 0.54452  0.0 21.89  0 0.6240 6.151  97.9 1.6687  4 437  21.2 18.46
## 141 0.29090  0.0 21.89  0 0.6240 6.174  93.6 1.6119  4 437  21.2 24.16
## 142 1.62864  0.0 21.89  0 0.6240 5.019 100.0 1.4394  4 437  21.2 34.41
## 143 3.32105  0.0 19.58  1 0.8710 5.403 100.0 1.3216  5 403  14.7 26.82
## 144 4.09740  0.0 19.58  0 0.8710 5.468 100.0 1.4118  5 403  14.7 26.42
## 145 2.77974  0.0 19.58  0 0.8710 4.903  97.8 1.3459  5 403  14.7 29.29
## 146 2.37934  0.0 19.58  0 0.8710 6.130 100.0 1.4191  5 403  14.7 27.80
## 147 2.15505  0.0 19.58  0 0.8710 5.628 100.0 1.5166  5 403  14.7 16.65
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## 148 2.36862  0.0 19.58   0 0.8710 4.926  95.7 1.4608  5 403  14.7 29.53
## 149 2.33099  0.0 19.58   0 0.8710 5.186  93.8 1.5296  5 403  14.7 28.32
## 150 2.73397  0.0 19.58   0 0.8710 5.597  94.9 1.5257  5 403  14.7 21.45
## 151 1.65660  0.0 19.58   0 0.8710 6.122  97.3 1.6180  5 403  14.7 14.10
## 152 1.49632  0.0 19.58   0 0.8710 5.404 100.0 1.5916  5 403  14.7 13.28
## 153 1.12658  0.0 19.58   1 0.8710 5.012  88.0 1.6102  5 403  14.7 12.12
## 154 2.14918  0.0 19.58   0 0.8710 5.709  98.5 1.6232  5 403  14.7 15.79
## 155 1.41385  0.0 19.58   1 0.8710 6.129  96.0 1.7494  5 403  14.7 15.12
## 156 3.53501  0.0 19.58   1 0.8710 6.152  82.6 1.7455  5 403  14.7 15.02
## 157 2.44668  0.0 19.58   0 0.8710 5.272  94.0 1.7364  5 403  14.7 16.14
## 158 1.22358  0.0 19.58   0 0.6050 6.943  97.4 1.8773  5 403  14.7  4.59
## 159 1.34284  0.0 19.58   0 0.6050 6.066 100.0 1.7573  5 403  14.7  6.43
## 160 1.42502  0.0 19.58   0 0.8710 6.510 100.0 1.7659  5 403  14.7  7.39
## 161 1.27346  0.0 19.58   1 0.6050 6.250  92.6 1.7984  5 403  14.7  5.50
## 162 1.46336  0.0 19.58   0 0.6050 7.489  90.8 1.9709  5 403  14.7  1.73
## 163 1.83377  0.0 19.58   1 0.6050 7.802  98.2 2.0407  5 403  14.7  1.92
## 164 1.51902  0.0 19.58   1 0.6050 8.375  93.9 2.1620  5 403  14.7  3.32
## 165 2.24236  0.0 19.58   0 0.6050 5.854  91.8 2.4220  5 403  14.7 11.64
## 166 2.92400  0.0 19.58   0 0.6050 6.101  93.0 2.2834  5 403  14.7  9.81
## 167 2.01019  0.0 19.58   0 0.6050 7.929  96.2 2.0459  5 403  14.7  3.70
## 168 1.80028  0.0 19.58   0 0.6050 5.877  79.2 2.4259  5 403  14.7 12.14
## 169 2.30040  0.0 19.58   0 0.6050 6.319  96.1 2.1000  5 403  14.7 11.10
## 170 2.44953  0.0 19.58   0 0.6050 6.402  95.2 2.2625  5 403  14.7 11.32
## 171 1.20742  0.0 19.58   0 0.6050 5.875  94.6 2.4259  5 403  14.7 14.43
## 172 2.31390  0.0 19.58   0 0.6050 5.880  97.3 2.3887  5 403  14.7 12.03
## 173 0.13914  0.0  4.05   0 0.5100 5.572  88.5 2.5961  5 296  16.6 14.69
## 174 0.09178  0.0  4.05   0 0.5100 6.416  84.1 2.6463  5 296  16.6  9.04
## 175 0.08447  0.0  4.05   0 0.5100 5.859  68.7 2.7019  5 296  16.6  9.64
## 176 0.06664  0.0  4.05   0 0.5100 6.546  33.1 3.1323  5 296  16.6  5.33
## 177 0.07022  0.0  4.05   0 0.5100 6.020  47.2 3.5549  5 296  16.6 10.11
## 178 0.05425  0.0  4.05   0 0.5100 6.315  73.4 3.3175  5 296  16.6  6.29
## 179 0.06642  0.0  4.05   0 0.5100 6.860  74.4 2.9153  5 296  16.6  6.92
## 180 0.05780  0.0  2.46   0 0.4880 6.980  58.4 2.8290  3 193  17.8  5.04
## 181 0.06588  0.0  2.46   0 0.4880 7.765  83.3 2.7410  3 193  17.8  7.56
## 182 0.06888  0.0  2.46   0 0.4880 6.144  62.2 2.5979  3 193  17.8  9.45
## 183 0.09103  0.0  2.46   0 0.4880 7.155  92.2 2.7006  3 193  17.8  4.82
## 184 0.10008  0.0  2.46   0 0.4880 6.563  95.6 2.8470  3 193  17.8  5.68
## 185 0.08308  0.0  2.46   0 0.4880 5.604  89.8 2.9879  3 193  17.8 13.98
## 186 0.06047  0.0  2.46   0 0.4880 6.153  68.8 3.2797  3 193  17.8 13.15
## 187 0.05602  0.0  2.46   0 0.4880 7.831  53.6 3.1992  3 193  17.8  4.45
## 188 0.07875 45.0  3.44   0 0.4370 6.782  41.1 3.7886  5 398  15.2  6.68
## 189 0.12579 45.0  3.44   0 0.4370 6.556  29.1 4.5667  5 398  15.2  4.56
## 190 0.08370 45.0  3.44   0 0.4370 7.185  38.9 4.5667  5 398  15.2  5.39
## 191 0.09068 45.0  3.44   0 0.4370 6.951  21.5 6.4798  5 398  15.2  5.10
## 192 0.06911 45.0  3.44   0 0.4370 6.739  30.8 6.4798  5 398  15.2  4.69
## 193 0.08664 45.0  3.44   0 0.4370 7.178  26.3 6.4798  5 398  15.2  2.87
## 194 0.02187 60.0  2.93   0 0.4010 6.800   9.9 6.2196  1 265  15.6  5.03
## 195 0.01439 60.0  2.93   0 0.4010 6.604  18.8 6.2196  1 265  15.6  4.38
## 196 0.01381 80.0  0.46   0 0.4220 7.875  32.0 5.6484  4 255  14.4  2.97
## 197 0.04011 80.0  1.52   0 0.4040 7.287  34.1 7.3090  2 329  12.6  4.08
## 198 0.04666 80.0  1.52   0 0.4040 7.107  36.6 7.3090  2 329  12.6  8.61
## 199 0.03768 80.0  1.52   0 0.4040 7.274  38.3 7.3090  2 329  12.6  6.62
## 200 0.03150 95.0  1.47   0 0.4030 6.975  15.3 7.6534  3 402  17.0  4.56
## 201 0.01778 95.0  1.47   0 0.4030 7.135  13.9 7.6534  3 402  17.0  4.45
```

```
## 202  0.03445  82.5   2.03   0 0.4150 6.162  38.4  6.2700  2 348  14.7  7.43
## 203  0.02177  82.5   2.03   0 0.4150 7.610  15.7  6.2700  2 348  14.7  3.11
## 204  0.03510  95.0   2.68   0 0.4161 7.853  33.2  5.1180  4 224  14.7  3.81
## 205  0.02009  95.0   2.68   0 0.4161 8.034  31.9  5.1180  4 224  14.7  2.88
## 206  0.13642   0.0  10.59   0 0.4890 5.891  22.3  3.9454  4 277  18.6 10.87
## 207  0.22969   0.0  10.59   0 0.4890 6.326  52.5  4.3549  4 277  18.6 10.97
## 208  0.25199   0.0  10.59   0 0.4890 5.783  72.7  4.3549  4 277  18.6 18.06
## 209  0.13587   0.0  10.59   1 0.4890 6.064  59.1  4.2392  4 277  18.6 14.66
## 210  0.43571   0.0  10.59   1 0.4890 5.344 100.0  3.8750  4 277  18.6 23.09
## 211  0.17446   0.0  10.59   1 0.4890 5.960  92.1  3.8771  4 277  18.6 17.27
## 212  0.37578   0.0  10.59   1 0.4890 5.404  88.6  3.6650  4 277  18.6 23.98
## 213  0.21719   0.0  10.59   1 0.4890 5.807  53.8  3.6526  4 277  18.6 16.03
## 214  0.14052   0.0  10.59   0 0.4890 6.375  32.3  3.9454  4 277  18.6  9.38
## 215  0.28955   0.0  10.59   0 0.4890 5.412   9.8  3.5875  4 277  18.6 29.55
## 216  0.19802   0.0  10.59   0 0.4890 6.182  42.4  3.9454  4 277  18.6  9.47
## 217  0.04560   0.0  13.89   1 0.5500 5.888  56.0  3.1121  5 276  16.4 13.51
## 218  0.07013   0.0  13.89   0 0.5500 6.642  85.1  3.4211  5 276  16.4  9.69
## 219  0.11069   0.0  13.89   1 0.5500 5.951  93.8  2.8893  5 276  16.4 17.92
## 220  0.11425   0.0  13.89   1 0.5500 6.373  92.4  3.3633  5 276  16.4 10.50
## 221  0.35809   0.0   6.20   1 0.5070 6.951  88.5  2.8617  8 307  17.4  9.71
## 222  0.40771   0.0   6.20   1 0.5070 6.164  91.3  3.0480  8 307  17.4 21.46
## 223  0.62356   0.0   6.20   1 0.5070 6.879  77.7  3.2721  8 307  17.4  9.93
## 224  0.61470   0.0   6.20   0 0.5070 6.618  80.8  3.2721  8 307  17.4  7.60
## 225  0.31533   0.0   6.20   0 0.5040 8.266  78.3  2.8944  8 307  17.4  4.14
## 226  0.52693   0.0   6.20   0 0.5040 8.725  83.0  2.8944  8 307  17.4  4.63
## 227  0.38214   0.0   6.20   0 0.5040 8.040  86.5  3.2157  8 307  17.4  3.13
## 228  0.41238   0.0   6.20   0 0.5040 7.163  79.9  3.2157  8 307  17.4  6.36
## 229  0.29819   0.0   6.20   0 0.5040 7.686  17.0  3.3751  8 307  17.4  3.92
## 230  0.44178   0.0   6.20   0 0.5040 6.552  21.4  3.3751  8 307  17.4  3.76
## 231  0.53700   0.0   6.20   0 0.5040 5.981  68.1  3.6715  8 307  17.4 11.65
## 232  0.46296   0.0   6.20   0 0.5040 7.412  76.9  3.6715  8 307  17.4  5.25
## 233  0.57529   0.0   6.20   0 0.5070 8.337  73.3  3.8384  8 307  17.4  2.47
## 234  0.33147   0.0   6.20   0 0.5070 8.247  70.4  3.6519  8 307  17.4  3.95
## 235  0.44791   0.0   6.20   1 0.5070 6.726  66.5  3.6519  8 307  17.4  8.05
## 236  0.33045   0.0   6.20   0 0.5070 6.086  61.5  3.6519  8 307  17.4 10.88
## 237  0.52058   0.0   6.20   1 0.5070 6.631  76.5  4.1480  8 307  17.4  9.54
## 238  0.51183   0.0   6.20   0 0.5070 7.358  71.6  4.1480  8 307  17.4  4.73
## 239  0.08244  30.0   4.93   0 0.4280 6.481  18.5  6.1899  6 300  16.6  6.36
## 240  0.09252  30.0   4.93   0 0.4280 6.606  42.2  6.1899  6 300  16.6  7.37
## 241  0.11329  30.0   4.93   0 0.4280 6.897  54.3  6.3361  6 300  16.6 11.38
## 242  0.10612  30.0   4.93   0 0.4280 6.095  65.1  6.3361  6 300  16.6 12.40
## 243  0.10290  30.0   4.93   0 0.4280 6.358  52.9  7.0355  6 300  16.6 11.22
## 244  0.12757  30.0   4.93   0 0.4280 6.393   7.8  7.0355  6 300  16.6  5.19
## 245  0.20608  22.0   5.86   0 0.4310 5.593  76.5  7.9549  7 330  19.1 12.50
## 246  0.19133  22.0   5.86   0 0.4310 5.605  70.2  7.9549  7 330  19.1 18.46
## 247  0.33983  22.0   5.86   0 0.4310 6.108  34.9  8.0555  7 330  19.1  9.16
## 248  0.19657  22.0   5.86   0 0.4310 6.226  79.2  8.0555  7 330  19.1 10.15
## 249  0.16439  22.0   5.86   0 0.4310 6.433  49.1  7.8265  7 330  19.1  9.52
## 250  0.19073  22.0   5.86   0 0.4310 6.718  17.5  7.8265  7 330  19.1  6.56
## 251  0.14030  22.0   5.86   0 0.4310 6.487  13.0  7.3967  7 330  19.1  5.90
## 252  0.21409  22.0   5.86   0 0.4310 6.438   8.9  7.3967  7 330  19.1  3.59
## 253  0.08221  22.0   5.86   0 0.4310 6.957   6.8  8.9067  7 330  19.1  3.53
## 254  0.36894  22.0   5.86   0 0.4310 8.259   8.4  8.9067  7 330  19.1  3.54
## 255  0.04819  80.0   3.64   0 0.3920 6.108  32.0  9.2203  1 315  16.4  6.57
```

```
## 256  0.03548  80.0   3.64   0 0.3920 5.876  19.1  9.2203  1 315   16.4  9.25
## 257  0.01538  90.0   3.75   0 0.3940 7.454  34.2  6.3361  3 244   15.9  3.11
## 258  0.61154  20.0   3.97   0 0.6470 8.704  86.9  1.8010  5 264   13.0  5.12
## 259  0.66351  20.0   3.97   0 0.6470 7.333 100.0  1.8946  5 264   13.0  7.79
## 260  0.65665  20.0   3.97   0 0.6470 6.842 100.0  2.0107  5 264   13.0  6.90
## 261  0.54011  20.0   3.97   0 0.6470 7.203  81.8  2.1121  5 264   13.0  9.59
## 262  0.53412  20.0   3.97   0 0.6470 7.520  89.4  2.1398  5 264   13.0  7.26
## 263  0.52014  20.0   3.97   0 0.6470 8.398  91.5  2.2885  5 264   13.0  5.91
## 264  0.82526  20.0   3.97   0 0.6470 7.327  94.5  2.0788  5 264   13.0 11.25
## 265  0.55007  20.0   3.97   0 0.6470 7.206  91.6  1.9301  5 264   13.0  8.10
## 266  0.76162  20.0   3.97   0 0.6470 5.560  62.8  1.9865  5 264   13.0 10.45
## 267  0.78570  20.0   3.97   0 0.6470 7.014  84.6  2.1329  5 264   13.0 14.79
## 268  0.57834  20.0   3.97   0 0.5750 8.297  67.0  2.4216  5 264   13.0  7.44
## 269  0.54050  20.0   3.97   0 0.5750 7.470  52.6  2.8720  5 264   13.0  3.16
## 270  0.09065  20.0   6.96   1 0.4640 5.920  61.5  3.9175  3 223   18.6 13.65
## 271  0.29916  20.0   6.96   0 0.4640 5.856  42.1  4.4290  3 223   18.6 13.00
## 272  0.16211  20.0   6.96   0 0.4640 6.240  16.3  4.4290  3 223   18.6  6.59
## 273  0.11460  20.0   6.96   0 0.4640 6.538  58.7  3.9175  3 223   18.6  7.73
## 274  0.22188  20.0   6.96   1 0.4640 7.691  51.8  4.3665  3 223   18.6  6.58
## 275  0.05644  40.0   6.41   1 0.4470 6.758  32.9  4.0776  4 254   17.6  3.53
## 276  0.09604  40.0   6.41   0 0.4470 6.854  42.8  4.2673  4 254   17.6  2.98
## 277  0.10469  40.0   6.41   1 0.4470 7.267  49.0  4.7872  4 254   17.6  6.05
## 278  0.06127  40.0   6.41   1 0.4470 6.826  27.6  4.8628  4 254   17.6  4.16
## 279  0.07978  40.0   6.41   0 0.4470 6.482  32.1  4.1403  4 254   17.6  7.19
## 280  0.21038  20.0   3.33   0 0.4429 6.812  32.2  4.1007  5 216   14.9  4.85
## 281  0.03578  20.0   3.33   0 0.4429 7.820  64.5  4.6947  5 216   14.9  3.76
## 282  0.03705  20.0   3.33   0 0.4429 6.968  37.2  5.2447  5 216   14.9  4.59
## 283  0.06129  20.0   3.33   1 0.4429 7.645  49.7  5.2119  5 216   14.9  3.01
## 284  0.01501  90.0   1.21   1 0.4010 7.923  24.8  5.8850  1 198   13.6  3.16
## 285  0.00906  90.0   2.97   0 0.4000 7.088  20.8  7.3073  1 285   15.3  7.85
## 286  0.01096  55.0   2.25   0 0.3890 6.453  31.9  7.3073  1 300   15.3  8.23
## 287  0.01965  80.0   1.76   0 0.3850 6.230  31.5  9.0892  1 241   18.2 12.93
## 288  0.03871  52.5   5.32   0 0.4050 6.209  31.3  7.3172  6 293   16.6  7.14
## 289  0.04590  52.5   5.32   0 0.4050 6.315  45.6  7.3172  6 293   16.6  7.60
## 290  0.04297  52.5   5.32   0 0.4050 6.565  22.9  7.3172  6 293   16.6  9.51
## 291  0.03502  80.0   4.95   0 0.4110 6.861  27.9  5.1167  4 245   19.2  3.33
## 292  0.07886  80.0   4.95   0 0.4110 7.148  27.7  5.1167  4 245   19.2  3.56
## 293  0.03615  80.0   4.95   0 0.4110 6.630  23.4  5.1167  4 245   19.2  4.70
## 294  0.08265   0.0  13.92   0 0.4370 6.127  18.4  5.5027  4 289   16.0  8.58
## 295  0.08199   0.0  13.92   0 0.4370 6.009  42.3  5.5027  4 289   16.0 10.40
## 296  0.12932   0.0  13.92   0 0.4370 6.678  31.1  5.9604  4 289   16.0  6.27
## 297  0.05372   0.0  13.92   0 0.4370 6.549  51.0  5.9604  4 289   16.0  7.39
## 298  0.14103   0.0  13.92   0 0.4370 5.790  58.0  6.3200  4 289   16.0 15.84
## 299  0.06466  70.0   2.24   0 0.4000 6.345  20.1  7.8278  5 358   14.8  4.97
## 300  0.05561  70.0   2.24   0 0.4000 7.041  10.0  7.8278  5 358   14.8  4.74
## 301  0.04417  70.0   2.24   0 0.4000 6.871  47.4  7.8278  5 358   14.8  6.07
## 302  0.03537  34.0   6.09   0 0.4330 6.590  40.4  5.4917  7 329   16.1  9.50
## 303  0.09266  34.0   6.09   0 0.4330 6.495  18.4  5.4917  7 329   16.1  8.67
## 304  0.10000  34.0   6.09   0 0.4330 6.982  17.7  5.4917  7 329   16.1  4.86
## 305  0.05515  33.0   2.18   0 0.4720 7.236  41.1  4.0220  7 222   18.4  6.93
## 306  0.05479  33.0   2.18   0 0.4720 6.616  58.1  3.3700  7 222   18.4  8.93
## 307  0.07503  33.0   2.18   0 0.4720 7.420  71.9  3.0992  7 222   18.4  6.47
## 308  0.04932  33.0   2.18   0 0.4720 6.849  70.3  3.1827  7 222   18.4  7.53
## 309  0.49298   0.0   9.90   0 0.5440 6.635  82.5  3.3175  4 304   18.4  4.54
```

```
## 310  0.34940   0.0   9.90    0 0.5440 5.972  76.7  3.1025   4 304   18.4  9.97
## 311  2.63548   0.0   9.90    0 0.5440 4.973  37.8  2.5194   4 304   18.4 12.64
## 312  0.79041   0.0   9.90    0 0.5440 6.122  52.8  2.6403   4 304   18.4  5.98
## 313  0.26169   0.0   9.90    0 0.5440 6.023  90.4  2.8340   4 304   18.4 11.72
## 314  0.26938   0.0   9.90    0 0.5440 6.266  82.8  3.2628   4 304   18.4  7.90
## 315  0.36920   0.0   9.90    0 0.5440 6.567  87.3  3.6023   4 304   18.4  9.28
## 316  0.25356   0.0   9.90    0 0.5440 5.705  77.7  3.9450   4 304   18.4 11.50
## 317  0.31827   0.0   9.90    0 0.5440 5.914  83.2  3.9986   4 304   18.4 18.33
## 318  0.24522   0.0   9.90    0 0.5440 5.782  71.7  4.0317   4 304   18.4 15.94
## 319  0.40202   0.0   9.90    0 0.5440 6.382  67.2  3.5325   4 304   18.4 10.36
## 320  0.47547   0.0   9.90    0 0.5440 6.113  58.8  4.0019   4 304   18.4 12.73
## 321  0.16760   0.0   7.38    0 0.4930 6.426  52.3  4.5404   5 287   19.6  7.20
## 322  0.18159   0.0   7.38    0 0.4930 6.376  54.3  4.5404   5 287   19.6  6.87
## 323  0.35114   0.0   7.38    0 0.4930 6.041  49.9  4.7211   5 287   19.6  7.70
## 324  0.28392   0.0   7.38    0 0.4930 5.708  74.3  4.7211   5 287   19.6 11.74
## 325  0.34109   0.0   7.38    0 0.4930 6.415  40.1  4.7211   5 287   19.6  6.12
## 326  0.19186   0.0   7.38    0 0.4930 6.431  14.7  5.4159   5 287   19.6  5.08
## 327  0.30347   0.0   7.38    0 0.4930 6.312  28.9  5.4159   5 287   19.6  6.15
## 328  0.24103   0.0   7.38    0 0.4930 6.083  43.7  5.4159   5 287   19.6 12.79
## 329  0.06617   0.0   3.24    0 0.4600 5.868  25.8  5.2146   4 430   16.9  9.97
## 330  0.06724   0.0   3.24    0 0.4600 6.333  17.2  5.2146   4 430   16.9  7.34
## 331  0.04544   0.0   3.24    0 0.4600 6.144  32.2  5.8736   4 430   16.9  9.09
## 332  0.05023  35.0   6.06    0 0.4379 5.706  28.4  6.6407   1 304   16.9 12.43
## 333  0.03466  35.0   6.06    0 0.4379 6.031  23.3  6.6407   1 304   16.9  7.83
## 334  0.05083   0.0   5.19    0 0.5150 6.316  38.1  6.4584   5 224   20.2  5.68
## 335  0.03738   0.0   5.19    0 0.5150 6.310  38.5  6.4584   5 224   20.2  6.75
## 336  0.03961   0.0   5.19    0 0.5150 6.037  34.5  5.9853   5 224   20.2  8.01
## 337  0.03427   0.0   5.19    0 0.5150 5.869  46.3  5.2311   5 224   20.2  9.80
## 338  0.03041   0.0   5.19    0 0.5150 5.895  59.6  5.6150   5 224   20.2 10.56
## 339  0.03306   0.0   5.19    0 0.5150 6.059  37.3  4.8122   5 224   20.2  8.51
## 340  0.05497   0.0   5.19    0 0.5150 5.985  45.4  4.8122   5 224   20.2  9.74
## 341  0.06151   0.0   5.19    0 0.5150 5.968  58.5  4.8122   5 224   20.2  9.29
## 342  0.01301  35.0   1.52    0 0.4420 7.241  49.3  7.0379   1 284   15.5  5.49
## 343  0.02498   0.0   1.89    0 0.5180 6.540  59.7  6.2669   1 422   15.9  8.65
## 344  0.02543  55.0   3.78    0 0.4840 6.696  56.4  5.7321   5 370   17.6  7.18
## 345  0.03049  55.0   3.78    0 0.4840 6.874  28.1  6.4654   5 370   17.6  4.61
## 346  0.03113   0.0   4.39    0 0.4420 6.014  48.5  8.0136   3 352   18.8 10.53
## 347  0.06162   0.0   4.39    0 0.4420 5.898  52.3  8.0136   3 352   18.8 12.67
## 348  0.01870  85.0   4.15    0 0.4290 6.516  27.7  8.5353   4 351   17.9  6.36
## 349  0.01501  80.0   2.01    0 0.4350 6.635  29.7  8.3440   4 280   17.0  5.99
## 350  0.02899  40.0   1.25    0 0.4290 6.939  34.5  8.7921   1 335   19.7  5.89
## 351  0.06211  40.0   1.25    0 0.4290 6.490  44.4  8.7921   1 335   19.7  5.98
## 352  0.07950  60.0   1.69    0 0.4110 6.579  35.9 10.7103   4 411   18.3  5.49
## 353  0.07244  60.0   1.69    0 0.4110 5.884  18.5 10.7103   4 411   18.3  7.79
## 354  0.01709  90.0   2.02    0 0.4100 6.728  36.1 12.1265   5 187   17.0  4.50
## 355  0.04301  80.0   1.91    0 0.4130 5.663  21.9 10.5857   4 334   22.0  8.05
## 356  0.10659  80.0   1.91    0 0.4130 5.936  19.5 10.5857   4 334   22.0  5.57
## 357  8.98296   0.0  18.10    1 0.7700 6.212  97.4  2.1222  24 666   20.2 17.60
## 358  3.84970   0.0  18.10    1 0.7700 6.395  91.0  2.5052  24 666   20.2 13.27
## 359  5.20177   0.0  18.10    1 0.7700 6.127  83.4  2.7227  24 666   20.2 11.48
## 360  4.26131   0.0  18.10    0 0.7700 6.112  81.3  2.5091  24 666   20.2 12.67
## 361  4.54192   0.0  18.10    0 0.7700 6.398  88.0  2.5182  24 666   20.2  7.79
## 362  3.83684   0.0  18.10    0 0.7700 6.251  91.1  2.2955  24 666   20.2 14.19
## 363  3.67822   0.0  18.10    0 0.7700 5.362  96.2  2.1036  24 666   20.2 10.19
```

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## 364  4.22239   0.0 18.10   1 0.7700 5.803  89.0  1.9047  24 666   20.2 14.64
## 365  3.47428   0.0 18.10   1 0.7180 8.780  82.9  1.9047  24 666   20.2  5.29
## 366  4.55587   0.0 18.10   0 0.7180 3.561  87.9  1.6132  24 666   20.2  7.12
## 367  3.69695   0.0 18.10   0 0.7180 4.963  91.4  1.7523  24 666   20.2 14.00
## 368 13.52220   0.0 18.10   0 0.6310 3.863 100.0  1.5106  24 666   20.2 13.33
## 369  4.89822   0.0 18.10   0 0.6310 4.970 100.0  1.3325  24 666   20.2  3.26
## 370  5.66998   0.0 18.10   1 0.6310 6.683  96.8  1.3567  24 666   20.2  3.73
## 371  6.53876   0.0 18.10   1 0.6310 7.016  97.5  1.2024  24 666   20.2  2.96
## 372  9.23230   0.0 18.10   0 0.6310 6.216 100.0  1.1691  24 666   20.2  9.53
## 373  8.26725   0.0 18.10   1 0.6680 5.875  89.6  1.1296  24 666   20.2  8.88
## 374 11.10810   0.0 18.10   0 0.6680 4.906 100.0  1.1742  24 666   20.2 34.77
## 375 18.49820   0.0 18.10   0 0.6680 4.138 100.0  1.1370  24 666   20.2 37.97
## 376 19.60910   0.0 18.10   0 0.6710 7.313  97.9  1.3163  24 666   20.2 13.44
## 377 15.28800   0.0 18.10   0 0.6710 6.649  93.3  1.3449  24 666   20.2 23.24
## 378  9.82349   0.0 18.10   0 0.6710 6.794  98.8  1.3580  24 666   20.2 21.24
## 379 23.64820   0.0 18.10   0 0.6710 6.380  96.2  1.3861  24 666   20.2 23.69
## 380 17.86670   0.0 18.10   0 0.6710 6.223 100.0  1.3861  24 666   20.2 21.78
## 381 88.97620   0.0 18.10   0 0.6710 6.968  91.9  1.4165  24 666   20.2 17.21
## 382 15.87440   0.0 18.10   0 0.6710 6.545  99.1  1.5192  24 666   20.2 21.08
## 383  9.18702   0.0 18.10   0 0.7000 5.536 100.0  1.5804  24 666   20.2 23.60
## 384  7.99248   0.0 18.10   0 0.7000 5.520 100.0  1.5331  24 666   20.2 24.56
## 385 20.08490   0.0 18.10   0 0.7000 4.368  91.2  1.4395  24 666   20.2 30.63
## 386 16.81180   0.0 18.10   0 0.7000 5.277  98.1  1.4261  24 666   20.2 30.81
## 387 24.39380   0.0 18.10   0 0.7000 4.652 100.0  1.4672  24 666   20.2 28.28
## 388 22.59710   0.0 18.10   0 0.7000 5.000  89.5  1.5184  24 666   20.2 31.99
## 389 14.33370   0.0 18.10   0 0.7000 4.880 100.0  1.5895  24 666   20.2 30.62
## 390  8.15174   0.0 18.10   0 0.7000 5.390  98.9  1.7281  24 666   20.2 20.85
## 391  6.96215   0.0 18.10   0 0.7000 5.713  97.0  1.9265  24 666   20.2 17.11
## 392  5.29305   0.0 18.10   0 0.7000 6.051  82.5  2.1678  24 666   20.2 18.76
## 393 11.57790   0.0 18.10   0 0.7000 5.036  97.0  1.7700  24 666   20.2 25.68
## 394  8.64476   0.0 18.10   0 0.6930 6.193  92.6  1.7912  24 666   20.2 15.17
## 395 13.35980   0.0 18.10   0 0.6930 5.887  94.7  1.7821  24 666   20.2 16.35
## 396  8.71675   0.0 18.10   0 0.6930 6.471  98.8  1.7257  24 666   20.2 17.12
## 397  5.87205   0.0 18.10   0 0.6930 6.405  96.0  1.6768  24 666   20.2 19.37
## 398  7.67202   0.0 18.10   0 0.6930 5.747  98.9  1.6334  24 666   20.2 19.92
## 399 38.35180   0.0 18.10   0 0.6930 5.453 100.0  1.4896  24 666   20.2 30.59
## 400  9.91655   0.0 18.10   0 0.6930 5.852  77.8  1.5004  24 666   20.2 29.97
## 401 25.04610   0.0 18.10   0 0.6930 5.987 100.0  1.5888  24 666   20.2 26.77
## 402 14.23620   0.0 18.10   0 0.6930 6.343 100.0  1.5741  24 666   20.2 20.32
## 403  9.59571   0.0 18.10   0 0.6930 6.404 100.0  1.6390  24 666   20.2 20.31
## 404 24.80170   0.0 18.10   0 0.6930 5.349  96.0  1.7028  24 666   20.2 19.77
## 405 41.52920   0.0 18.10   0 0.6930 5.531  85.4  1.6074  24 666   20.2 27.38
## 406 67.92080   0.0 18.10   0 0.6930 5.683 100.0  1.4254  24 666   20.2 22.98
## 407 20.71620   0.0 18.10   0 0.6590 4.138 100.0  1.1781  24 666   20.2 23.34
## 408 11.95110   0.0 18.10   0 0.6590 5.608 100.0  1.2852  24 666   20.2 12.13
## 409  7.40389   0.0 18.10   0 0.5970 5.617  97.9  1.4547  24 666   20.2 26.40
## 410 14.43830   0.0 18.10   0 0.5970 6.852 100.0  1.4655  24 666   20.2 19.78
## 411 51.13580   0.0 18.10   0 0.5970 5.757 100.0  1.4130  24 666   20.2 10.11
## 412 14.05070   0.0 18.10   0 0.5970 6.657 100.0  1.5275  24 666   20.2 21.22
## 413 18.81100   0.0 18.10   0 0.5970 4.628 100.0  1.5539  24 666   20.2 34.37
## 414 28.65580   0.0 18.10   0 0.5970 5.155 100.0  1.5894  24 666   20.2 20.08
## 415 45.74610   0.0 18.10   0 0.6930 4.519 100.0  1.6582  24 666   20.2 36.98
## 416 18.08460   0.0 18.10   0 0.6790 6.434 100.0  1.8347  24 666   20.2 29.05
## 417 10.83420   0.0 18.10   0 0.6790 6.782  90.8  1.8195  24 666   20.2 25.79
```

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## 418 25.94060   0.0 18.10   0 0.6790 5.304  89.1 1.6475  24 666   20.2 26.64
## 419 73.53410   0.0 18.10   0 0.6790 5.957 100.0 1.8026  24 666   20.2 20.62
## 420 11.81230   0.0 18.10   0 0.7180 6.824  76.5 1.7940  24 666   20.2 22.74
## 421 11.08740   0.0 18.10   0 0.7180 6.411 100.0 1.8589  24 666   20.2 15.02
## 422  7.02259   0.0 18.10   0 0.7180 6.006  95.3 1.8746  24 666   20.2 15.70
## 423 12.04820   0.0 18.10   0 0.6140 5.648  87.6 1.9512  24 666   20.2 14.10
## 424  7.05042   0.0 18.10   0 0.6140 6.103  85.1 2.0218  24 666   20.2 23.29
## 425  8.79212   0.0 18.10   0 0.5840 5.565  70.6 2.0635  24 666   20.2 17.16
## 426 15.86030   0.0 18.10   0 0.6790 5.896  95.4 1.9096  24 666   20.2 24.39
## 427 12.24720   0.0 18.10   0 0.5840 5.837  59.7 1.9976  24 666   20.2 15.69
## 428 37.66190   0.0 18.10   0 0.6790 6.202  78.7 1.8629  24 666   20.2 14.52
## 429  7.36711   0.0 18.10   0 0.6790 6.193  78.1 1.9356  24 666   20.2 21.52
## 430  9.33889   0.0 18.10   0 0.6790 6.380  95.6 1.9682  24 666   20.2 24.08
## 431  8.49213   0.0 18.10   0 0.5840 6.348  86.1 2.0527  24 666   20.2 17.64
## 432 10.06230   0.0 18.10   0 0.5840 6.833  94.3 2.0882  24 666   20.2 19.69
## 433  6.44405   0.0 18.10   0 0.5840 6.425  74.8 2.2004  24 666   20.2 12.03
## 434  5.58107   0.0 18.10   0 0.7130 6.436  87.9 2.3158  24 666   20.2 16.22
## 435 13.91340   0.0 18.10   0 0.7130 6.208  95.0 2.2222  24 666   20.2 15.17
## 436 11.16040   0.0 18.10   0 0.7400 6.629  94.6 2.1247  24 666   20.2 23.27
## 437 14.42080   0.0 18.10   0 0.7400 6.461  93.3 2.0026  24 666   20.2 18.05
## 438 15.17720   0.0 18.10   0 0.7400 6.152 100.0 1.9142  24 666   20.2 26.45
## 439 13.67810   0.0 18.10   0 0.7400 5.935  87.9 1.8206  24 666   20.2 34.02
## 440  9.39063   0.0 18.10   0 0.7400 5.627  93.9 1.8172  24 666   20.2 22.88
## 441 22.05110   0.0 18.10   0 0.7400 5.818  92.4 1.8662  24 666   20.2 22.11
## 442  9.72418   0.0 18.10   0 0.7400 6.406  97.2 2.0651  24 666   20.2 19.52
## 443  5.66637   0.0 18.10   0 0.7400 6.219 100.0 2.0048  24 666   20.2 16.59
## 444  9.96654   0.0 18.10   0 0.7400 6.485 100.0 1.9784  24 666   20.2 18.85
## 445 12.80230   0.0 18.10   0 0.7400 5.854  96.6 1.8956  24 666   20.2 23.79
## 446 10.67180   0.0 18.10   0 0.7400 6.459  94.8 1.9879  24 666   20.2 23.98
## 447  6.28807   0.0 18.10   0 0.7400 6.341  96.4 2.0720  24 666   20.2 17.79
## 448  9.92485   0.0 18.10   0 0.7400 6.251  96.6 2.1980  24 666   20.2 16.44
## 449  9.32909   0.0 18.10   0 0.7130 6.185  98.7 2.2616  24 666   20.2 18.13
## 450  7.52601   0.0 18.10   0 0.7130 6.417  98.3 2.1850  24 666   20.2 19.31
## 451  6.71772   0.0 18.10   0 0.7130 6.749  92.6 2.3236  24 666   20.2 17.44
## 452  5.44114   0.0 18.10   0 0.7130 6.655  98.2 2.3552  24 666   20.2 17.73
## 453  5.09017   0.0 18.10   0 0.7130 6.297  91.8 2.3682  24 666   20.2 17.27
## 454  8.24809   0.0 18.10   0 0.7130 7.393  99.3 2.4527  24 666   20.2 16.74
## 455  9.51363   0.0 18.10   0 0.7130 6.728  94.1 2.4961  24 666   20.2 18.71
## 456  4.75237   0.0 18.10   0 0.7130 6.525  86.5 2.4358  24 666   20.2 18.13
## 457  4.66883   0.0 18.10   0 0.7130 5.976  87.9 2.5806  24 666   20.2 19.01
## 458  8.20058   0.0 18.10   0 0.7130 5.936  80.3 2.7792  24 666   20.2 16.94
## 459  7.75223   0.0 18.10   0 0.7130 6.301  83.7 2.7831  24 666   20.2 16.23
## 460  6.80117   0.0 18.10   0 0.7130 6.081  84.4 2.7175  24 666   20.2 14.70
## 461  4.81213   0.0 18.10   0 0.7130 6.701  90.0 2.5975  24 666   20.2 16.42
## 462  3.69311   0.0 18.10   0 0.7130 6.376  88.4 2.5671  24 666   20.2 14.65
## 463  6.65492   0.0 18.10   0 0.7130 6.317  83.0 2.7344  24 666   20.2 13.99
## 464  5.82115   0.0 18.10   0 0.7130 6.513  89.9 2.8016  24 666   20.2 10.29
## 465  7.83932   0.0 18.10   0 0.6550 6.209  65.4 2.9634  24 666   20.2 13.22
## 466  3.16360   0.0 18.10   0 0.6550 5.759  48.2 3.0665  24 666   20.2 14.13
## 467  3.77498   0.0 18.10   0 0.6550 5.952  84.7 2.8715  24 666   20.2 17.15
## 468  4.42228   0.0 18.10   0 0.5840 6.003  94.5 2.5403  24 666   20.2 21.32
## 469 15.57570   0.0 18.10   0 0.5800 5.926  71.0 2.9084  24 666   20.2 18.13
## 470 13.07510   0.0 18.10   0 0.5800 5.713  56.7 2.8237  24 666   20.2 14.76
## 471  4.34879   0.0 18.10   0 0.5800 6.167  84.0 3.0334  24 666   20.2 16.29
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## 472  4.03841  0.0 18.10   0 0.5320 6.229 90.7 3.0993 24 666   20.2 12.87
## 473  3.56868  0.0 18.10   0 0.5800 6.437 75.0 2.8965 24 666   20.2 14.36
## 474  4.64689  0.0 18.10   0 0.6140 6.980 67.6 2.5329 24 666   20.2 11.66
## 475  8.05579  0.0 18.10   0 0.5840 5.427 95.4 2.4298 24 666   20.2 18.14
## 476  6.39312  0.0 18.10   0 0.5840 6.162 97.4 2.2060 24 666   20.2 24.10
## 477  4.87141  0.0 18.10   0 0.6140 6.484 93.6 2.3053 24 666   20.2 18.68
## 478 15.02340  0.0 18.10   0 0.6140 5.304 97.3 2.1007 24 666   20.2 24.91
## 479 10.23300  0.0 18.10   0 0.6140 6.185 96.7 2.1705 24 666   20.2 18.03
## 480 14.33370  0.0 18.10   0 0.6140 6.229 88.0 1.9512 24 666   20.2 13.11
## 481  5.82401  0.0 18.10   0 0.5320 6.242 64.7 3.4242 24 666   20.2 10.74
## 482  5.70818  0.0 18.10   0 0.5320 6.750 74.9 3.3317 24 666   20.2  7.74
## 483  5.73116  0.0 18.10   0 0.5320 7.061 77.0 3.4106 24 666   20.2  7.01
## 484  2.81838  0.0 18.10   0 0.5320 5.762 40.3 4.0983 24 666   20.2 10.42
## 485  2.37857  0.0 18.10   0 0.5830 5.871 41.9 3.7240 24 666   20.2 13.34
## 486  3.67367  0.0 18.10   0 0.5830 6.312 51.9 3.9917 24 666   20.2 10.58
## 487  5.69175  0.0 18.10   0 0.5830 6.114 79.8 3.5459 24 666   20.2 14.98
## 488  4.83567  0.0 18.10   0 0.5830 5.905 53.2 3.1523 24 666   20.2 11.45
## 489  0.15086  0.0 27.74   0 0.6090 5.454 92.7 1.8209  4 711   20.1 18.06
## 490  0.18337  0.0 27.74   0 0.6090 5.414 98.3 1.7554  4 711   20.1 23.97
## 491  0.20746  0.0 27.74   0 0.6090 5.093 98.0 1.8226  4 711   20.1 29.68
## 492  0.10574  0.0 27.74   0 0.6090 5.983 98.8 1.8681  4 711   20.1 18.07
## 493  0.11132  0.0 27.74   0 0.6090 5.983 83.5 2.1099  4 711   20.1 13.35
## 494  0.17331  0.0  9.69   0 0.5850 5.707 54.0 2.3817  6 391   19.2 12.01
## 495  0.27957  0.0  9.69   0 0.5850 5.926 42.6 2.3817  6 391   19.2 13.59
## 496  0.17899  0.0  9.69   0 0.5850 5.670 28.8 2.7986  6 391   19.2 17.60
## 497  0.28960  0.0  9.69   0 0.5850 5.390 72.9 2.7986  6 391   19.2 21.14
## 498  0.26838  0.0  9.69   0 0.5850 5.794 70.6 2.8927  6 391   19.2 14.10
## 499  0.23912  0.0  9.69   0 0.5850 6.019 65.3 2.4091  6 391   19.2 12.92
## 500  0.17783  0.0  9.69   0 0.5850 5.569 73.5 2.3999  6 391   19.2 15.10
## 501  0.22438  0.0  9.69   0 0.5850 6.027 79.7 2.4982  6 391   19.2 14.33
## 502  0.06263  0.0 11.93   0 0.5730 6.593 69.1 2.4786  1 273   21.0  9.67
## 503  0.04527  0.0 11.93   0 0.5730 6.120 76.7 2.2875  1 273   21.0  9.08
## 504  0.06076  0.0 11.93   0 0.5730 6.976 91.0 2.1675  1 273   21.0  5.64
## 505  0.10959  0.0 11.93   0 0.5730 6.794 89.3 2.3889  1 273   21.0  6.48
## 506  0.04741  0.0 11.93   0 0.5730 6.030 80.8 2.5050  1 273   21.0  7.88
##      medv
## 1    24.0
## 2    21.6
## 3    34.7
## 4    33.4
## 5    36.2
## 6    28.7
## 7    22.9
## 8    27.1
## 9    16.5
## 10   18.9
## 11   15.0
## 12   18.9
## 13   21.7
## 14   20.4
## 15   18.2
## 16   19.9
## 17   23.1
## 18   17.5
```

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## 19   20.2
## 20   18.2
## 21   13.6
## 22   19.6
## 23   15.2
## 24   14.5
## 25   15.6
## 26   13.9
## 27   16.6
## 28   14.8
## 29   18.4
## 30   21.0
## 31   12.7
## 32   14.5
## 33   13.2
## 34   13.1
## 35   13.5
## 36   18.9
## 37   20.0
## 38   21.0
## 39   24.7
## 40   30.8
## 41   34.9
## 42   26.6
## 43   25.3
## 44   24.7
## 45   21.2
## 46   19.3
## 47   20.0
## 48   16.6
## 49   14.4
## 50   19.4
## 51   19.7
## 52   20.5
## 53   25.0
## 54   23.4
## 55   18.9
## 56   35.4
## 57   24.7
## 58   31.6
## 59   23.3
## 60   19.6
## 61   18.7
## 62   16.0
## 63   22.2
## 64   25.0
## 65   33.0
## 66   23.5
## 67   19.4
## 68   22.0
## 69   17.4
## 70   20.9
## 71   24.2
## 72   21.7
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## 73   22.8
## 74   23.4
## 75   24.1
## 76   21.4
## 77   20.0
## 78   20.8
## 79   21.2
## 80   20.3
## 81   28.0
## 82   23.9
## 83   24.8
## 84   22.9
## 85   23.9
## 86   26.6
## 87   22.5
## 88   22.2
## 89   23.6
## 90   28.7
## 91   22.6
## 92   22.0
## 93   22.9
## 94   25.0
## 95   20.6
## 96   28.4
## 97   21.4
## 98   38.7
## 99   43.8
## 100 33.2
## 101 27.5
## 102 26.5
## 103 18.6
## 104 19.3
## 105 20.1
## 106 19.5
## 107 19.5
## 108 20.4
## 109 19.8
## 110 19.4
## 111 21.7
## 112 22.8
## 113 18.8
## 114 18.7
## 115 18.5
## 116 18.3
## 117 21.2
## 118 19.2
## 119 20.4
## 120 19.3
## 121 22.0
## 122 20.3
## 123 20.5
## 124 17.3
## 125 18.8
## 126 21.4
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## 127 15.7
## 128 16.2
## 129 18.0
## 130 14.3
## 131 19.2
## 132 19.6
## 133 23.0
## 134 18.4
## 135 15.6
## 136 18.1
## 137 17.4
## 138 17.1
## 139 13.3
## 140 17.8
## 141 14.0
## 142 14.4
## 143 13.4
## 144 15.6
## 145 11.8
## 146 13.8
## 147 15.6
## 148 14.6
## 149 17.8
## 150 15.4
## 151 21.5
## 152 19.6
## 153 15.3
## 154 19.4
## 155 17.0
## 156 15.6
## 157 13.1
## 158 41.3
## 159 24.3
## 160 23.3
## 161 27.0
## 162 50.0
## 163 50.0
## 164 50.0
## 165 22.7
## 166 25.0
## 167 50.0
## 168 23.8
## 169 23.8
## 170 22.3
## 171 17.4
## 172 19.1
## 173 23.1
## 174 23.6
## 175 22.6
## 176 29.4
## 177 23.2
## 178 24.6
## 179 29.9
## 180 37.2
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## 181 39.8
## 182 36.2
## 183 37.9
## 184 32.5
## 185 26.4
## 186 29.6
## 187 50.0
## 188 32.0
## 189 29.8
## 190 34.9
## 191 37.0
## 192 30.5
## 193 36.4
## 194 31.1
## 195 29.1
## 196 50.0
## 197 33.3
## 198 30.3
## 199 34.6
## 200 34.9
## 201 32.9
## 202 24.1
## 203 42.3
## 204 48.5
## 205 50.0
## 206 22.6
## 207 24.4
## 208 22.5
## 209 24.4
## 210 20.0
## 211 21.7
## 212 19.3
## 213 22.4
## 214 28.1
## 215 23.7
## 216 25.0
## 217 23.3
## 218 28.7
## 219 21.5
## 220 23.0
## 221 26.7
## 222 21.7
## 223 27.5
## 224 30.1
## 225 44.8
## 226 50.0
## 227 37.6
## 228 31.6
## 229 46.7
## 230 31.5
## 231 24.3
## 232 31.7
## 233 41.7
## 234 48.3
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## 235 29.0
## 236 24.0
## 237 25.1
## 238 31.5
## 239 23.7
## 240 23.3
## 241 22.0
## 242 20.1
## 243 22.2
## 244 23.7
## 245 17.6
## 246 18.5
## 247 24.3
## 248 20.5
## 249 24.5
## 250 26.2
## 251 24.4
## 252 24.8
## 253 29.6
## 254 42.8
## 255 21.9
## 256 20.9
## 257 44.0
## 258 50.0
## 259 36.0
## 260 30.1
## 261 33.8
## 262 43.1
## 263 48.8
## 264 31.0
## 265 36.5
## 266 22.8
## 267 30.7
## 268 50.0
## 269 43.5
## 270 20.7
## 271 21.1
## 272 25.2
## 273 24.4
## 274 35.2
## 275 32.4
## 276 32.0
## 277 33.2
## 278 33.1
## 279 29.1
## 280 35.1
## 281 45.4
## 282 35.4
## 283 46.0
## 284 50.0
## 285 32.2
## 286 22.0
## 287 20.1
## 288 23.2
```

```
## 289 22.3
## 290 24.8
## 291 28.5
## 292 37.3
## 293 27.9
## 294 23.9
## 295 21.7
## 296 28.6
## 297 27.1
## 298 20.3
## 299 22.5
## 300 29.0
## 301 24.8
## 302 22.0
## 303 26.4
## 304 33.1
## 305 36.1
## 306 28.4
## 307 33.4
## 308 28.2
## 309 22.8
## 310 20.3
## 311 16.1
## 312 22.1
## 313 19.4
## 314 21.6
## 315 23.8
## 316 16.2
## 317 17.8
## 318 19.8
## 319 23.1
## 320 21.0
## 321 23.8
## 322 23.1
## 323 20.4
## 324 18.5
## 325 25.0
## 326 24.6
## 327 23.0
## 328 22.2
## 329 19.3
## 330 22.6
## 331 19.8
## 332 17.1
## 333 19.4
## 334 22.2
## 335 20.7
## 336 21.1
## 337 19.5
## 338 18.5
## 339 20.6
## 340 19.0
## 341 18.7
## 342 32.7
```

```
## 343 16.5
## 344 23.9
## 345 31.2
## 346 17.5
## 347 17.2
## 348 23.1
## 349 24.5
## 350 26.6
## 351 22.9
## 352 24.1
## 353 18.6
## 354 30.1
## 355 18.2
## 356 20.6
## 357 17.8
## 358 21.7
## 359 22.7
## 360 22.6
## 361 25.0
## 362 19.9
## 363 20.8
## 364 16.8
## 365 21.9
## 366 27.5
## 367 21.9
## 368 23.1
## 369 50.0
## 370 50.0
## 371 50.0
## 372 50.0
## 373 50.0
## 374 13.8
## 375 13.8
## 376 15.0
## 377 13.9
## 378 13.3
## 379 13.1
## 380 10.2
## 381 10.4
## 382 10.9
## 383 11.3
## 384 12.3
## 385  8.8
## 386  7.2
## 387 10.5
## 388  7.4
## 389 10.2
## 390 11.5
## 391 15.1
## 392 23.2
## 393  9.7
## 394 13.8
## 395 12.7
## 396 13.1
```

```
## 397 12.5
## 398  8.5
## 399  5.0
## 400  6.3
## 401  5.6
## 402  7.2
## 403 12.1
## 404  8.3
## 405  8.5
## 406  5.0
## 407 11.9
## 408 27.9
## 409 17.2
## 410 27.5
## 411 15.0
## 412 17.2
## 413 17.9
## 414 16.3
## 415  7.0
## 416  7.2
## 417  7.5
## 418 10.4
## 419  8.8
## 420  8.4
## 421 16.7
## 422 14.2
## 423 20.8
## 424 13.4
## 425 11.7
## 426  8.3
## 427 10.2
## 428 10.9
## 429 11.0
## 430  9.5
## 431 14.5
## 432 14.1
## 433 16.1
## 434 14.3
## 435 11.7
## 436 13.4
## 437  9.6
## 438  8.7
## 439  8.4
## 440 12.8
## 441 10.5
## 442 17.1
## 443 18.4
## 444 15.4
## 445 10.8
## 446 11.8
## 447 14.9
## 448 12.6
## 449 14.1
## 450 13.0
```

```
## 451 13.4
## 452 15.2
## 453 16.1
## 454 17.8
## 455 14.9
## 456 14.1
## 457 12.7
## 458 13.5
## 459 14.9
## 460 20.0
## 461 16.4
## 462 17.7
## 463 19.5
## 464 20.2
## 465 21.4
## 466 19.9
## 467 19.0
## 468 19.1
## 469 19.1
## 470 20.1
## 471 19.9
## 472 19.6
## 473 23.2
## 474 29.8
## 475 13.8
## 476 13.3
## 477 16.7
## 478 12.0
## 479 14.6
## 480 21.4
## 481 23.0
## 482 23.7
## 483 25.0
## 484 21.8
## 485 20.6
## 486 21.2
## 487 19.1
## 488 20.6
## 489 15.2
## 490  7.0
## 491  8.1
## 492 13.6
## 493 20.1
## 494 21.8
## 495 24.5
## 496 23.1
## 497 19.7
## 498 18.3
## 499 21.2
## 500 17.5
## 501 16.8
## 502 22.4
## 503 20.6
## 504 23.9
```

```
## 505 22.0
## 506 11.9
```

There are 506 rows and 13 dolumns. The rows represent different suburbs in boston and the columns represent different stats about the suburbs.

```
?Boston
```
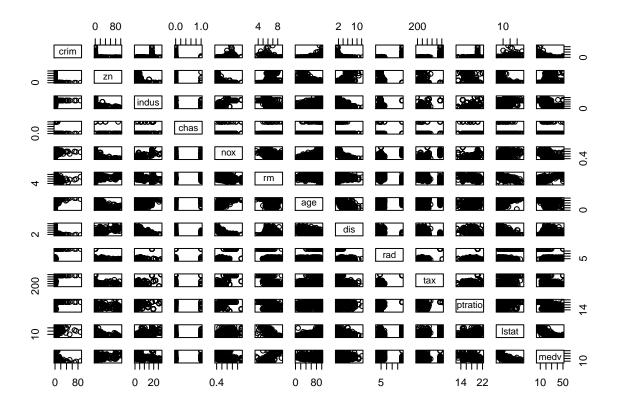
```
## starting httpd help server ... done
```

```
summary(Boston)
```

```
##       crim                zn             indus            chas
## Min.   : 0.00632   Min.   :  0.00   Min.   : 0.46   Min.   :0.00000
## 1st Qu.: 0.08205   1st Qu.:  0.00   1st Qu.: 5.19   1st Qu.:0.00000
## Median : 0.25651   Median :  0.00   Median : 9.69   Median :0.00000
## Mean   : 3.61352   Mean   : 11.36   Mean   :11.14   Mean   :0.06917
## 3rd Qu.: 3.67708   3rd Qu.: 12.50   3rd Qu.:18.10   3rd Qu.:0.00000
## Max.   :88.97620   Max.   :100.00   Max.   :27.74   Max.   :1.00000
##       nox               rm             age              dis
## Min.   :0.3850   Min.   :3.561   Min.   :  2.90   Min.   : 1.130
## 1st Qu.:0.4490   1st Qu.:5.886   1st Qu.: 45.02   1st Qu.: 2.100
## Median :0.5380   Median :6.208   Median : 77.50   Median : 3.207
## Mean   :0.5547   Mean   :6.285   Mean   : 68.57   Mean   : 3.795
## 3rd Qu.:0.6240   3rd Qu.:6.623   3rd Qu.: 94.08   3rd Qu.: 5.188
## Max.   :0.8710   Max.   :8.780   Max.   :100.00   Max.   :12.127
##       rad              tax            ptratio          lstat
## Min.   : 1.000   Min.   :187.0   Min.   :12.60   Min.   : 1.73
## 1st Qu.: 4.000   1st Qu.:279.0   1st Qu.:17.40   1st Qu.: 6.95
## Median : 5.000   Median :330.0   Median :19.05   Median :11.36
## Mean   : 9.549   Mean   :408.2   Mean   :18.46   Mean   :12.65
## 3rd Qu.:24.000   3rd Qu.:666.0   3rd Qu.:20.20   3rd Qu.:16.95
## Max.   :24.000   Max.   :711.0   Max.   :22.00   Max.   :37.97
##       medv
## Min.   : 5.00
## 1st Qu.:17.02
## Median :21.20
## Mean   :22.53
## 3rd Qu.:25.00
## Max.   :50.00
```

Pairwise Scatterplots
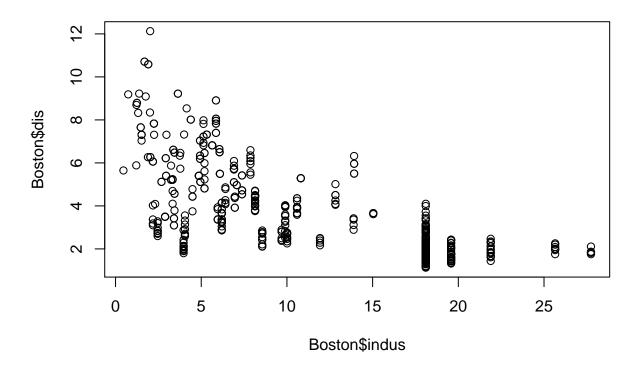
```
pairs(Boston)
```
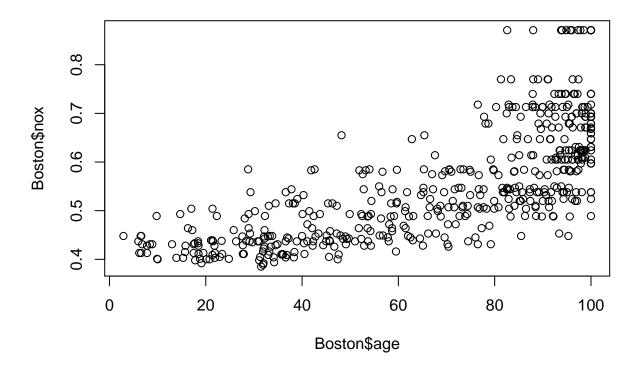
```
plot(Boston$age,Boston$crim)
```
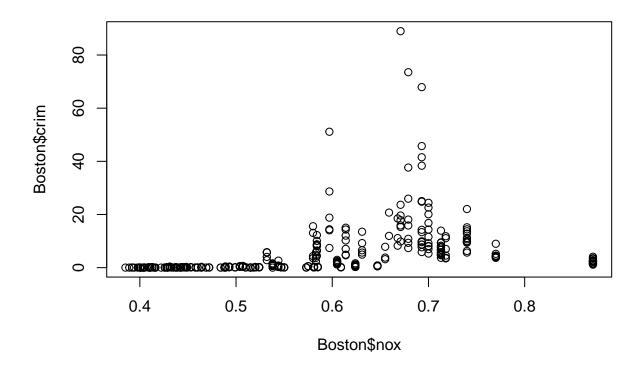
```
plot(Boston$indus,Boston$dis)
```
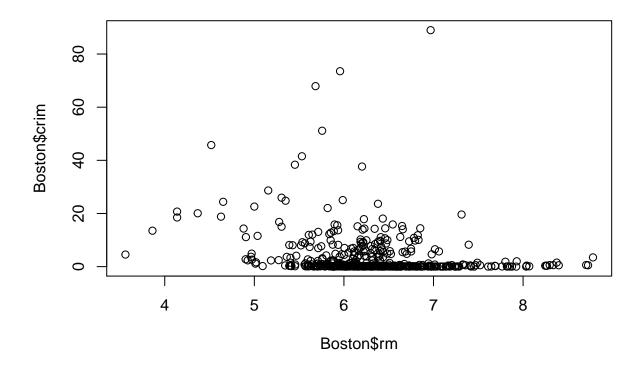
```
plot(Boston$age,Boston$nox)
```

```
plot(Boston$nox,Boston$crim)
```

```
plot(Boston$rm,Boston$crim)
```

As the age of units built prior to 1940 increases so does the crime rate. The amount of industrial acerage has a negative correlation with distance to employment centers. Thats very interesting since you would assume industrail acerage would house companies that employ tons of people but perhaps the 5 employment centers in the data are not of the industrail nature. As the number of units build prior to 1940 increases so does the nitric oxide concentration. Also, both average number of rooms per dwelling and nitric oxide levels seem to have some correlation with crime rate.
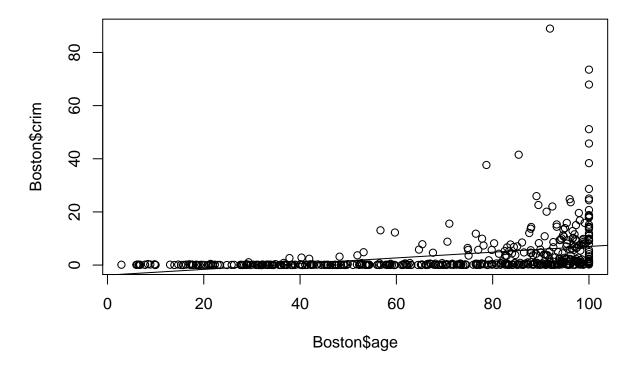
Looking for a relationship between Age of Units and Crime Rate

```
crime_age <- lm(Boston$crim~Boston$age)
summary(crime_age)
```

```
##
## Call:
## lm(formula = Boston$crim ~ Boston$age)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -6.789 -4.257 -1.230  1.527 82.849
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3.77791    0.94398  -4.002 7.22e-05 ***
## Boston$age   0.10779    0.01274   8.463 2.85e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 8.057 on 504 degrees of freedom
## Multiple R-squared:  0.1244, Adjusted R-squared:  0.1227
## F-statistic: 71.62 on 1 and 504 DF,  p-value: 2.855e-16
```

```
plot(Boston$age, Boston$crim)
abline(crime_age)
```
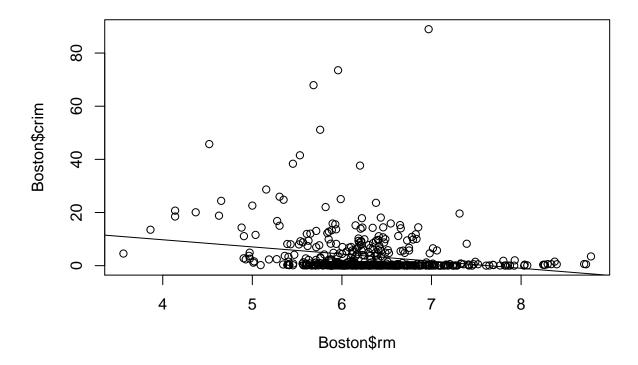

The summary does indicate some sort of relationship due to values of p-value and f-stat but the problem is the multiple r-squared value is very low. Also, a quick glance at the chart shows the line passes through a good chunk of the data but the function is probably not linear

Looking for a relationship between Nitrogen Oxide Concentration and Crime Rate

```
crime_rm <- lm(Boston$crim~Boston$rm)
summary(crime_rm)
```

```
##
## Call:
## lm(formula = Boston$crim ~ Boston$rm)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -6.604 -3.952 -2.654  0.989 87.197
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)    20.482        3.365    6.088 2.27e-09 ***
## Boston$rm       -2.684        0.532   -5.045 6.35e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.401 on 504 degrees of freedom
## Multiple R-squared:  0.04807,    Adjusted R-squared:  0.04618
## F-statistic: 25.45 on 1 and 504 DF,  p-value: 6.347e-07
```

```
plot(Boston$rm, Boston$crim)
abline(crime_rm)
```
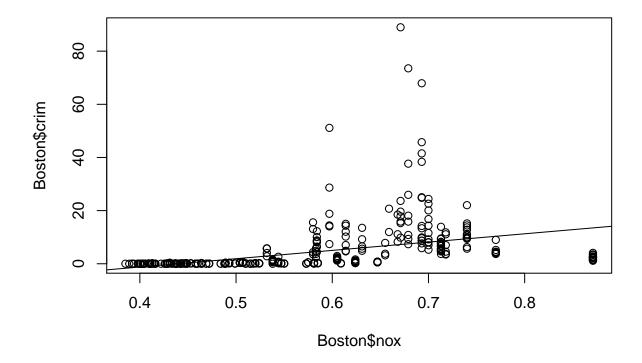

The summary does indicate some sort of relationship due to the highly signicant p-value but the function "fits" the data very poorly. In all likelyhood there is a relationship but is of the non-linear variety.

```
crime_nox <- lm(Boston$crim~Boston$nox)
summary(crime_nox)
```

```
##
## Call:
## lm(formula = Boston$crim ~ Boston$nox)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.371   -2.738   -0.974    0.559   81.728
##
```

```
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -13.720      1.699  -8.073 5.08e-15 ***
## Boston$nox    31.249      2.999  10.419  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 7.81 on 504 degrees of freedom
## Multiple R-squared:  0.1772, Adjusted R-squared:  0.1756
## F-statistic: 108.6 on 1 and 504 DF,  p-value: < 2.2e-16
```

```
plot(Boston$nox, Boston$crim)
abline(crime_nox)
```


The summary does indicate some sort of relationship due to the highly signicant p-value but the function "fits" the data very poorly. In all likelyhood there is a relationship but is of the non-linear variety.

Amount of Units built prior to 1940, nitric oxide concentration, and avg number of rooms per dwelling all seem to have some impact of crime rates. The amount of old units relationship to crime rate seems to somewhat linear but most likely still is curved. Both nitrix oxide and avg number of rooms seem to have a almost quadratic relation to crime rate.

```
summary(Boston)
```

```
##       crim                zn             indus            chas
##  Min.   : 0.00632   Min.   :  0.00   Min.   : 0.46   Min.   :0.00000
```

```
##    1st Qu.: 0.08205    1st Qu.:  0.00    1st Qu.: 5.19    1st Qu.:0.00000
##    Median : 0.25651    Median :  0.00    Median : 9.69    Median :0.00000
##    Mean   : 3.61352    Mean   : 11.36    Mean   :11.14    Mean   :0.06917
##    3rd Qu.: 3.67708    3rd Qu.: 12.50    3rd Qu.:18.10    3rd Qu.:0.00000
##    Max.   :88.97620    Max.   :100.00    Max.   :27.74    Max.   :1.00000
##        nox                rm              age               dis
##    Min.   :0.3850    Min.   :3.561    Min.   :  2.90    Min.   : 1.130
##    1st Qu.:0.4490    1st Qu.:5.886    1st Qu.: 45.02    1st Qu.: 2.100
##    Median :0.5380    Median :6.208    Median : 77.50    Median : 3.207
##    Mean   :0.5547    Mean   :6.285    Mean   : 68.57    Mean   : 3.795
##    3rd Qu.:0.6240    3rd Qu.:6.623    3rd Qu.: 94.08    3rd Qu.: 5.188
##    Max.   :0.8710    Max.   :8.780    Max.   :100.00    Max.   :12.127
##        rad               tax            ptratio           lstat
##    Min.   : 1.000    Min.   :187.0    Min.   :12.60    Min.   : 1.73
##    1st Qu.: 4.000    1st Qu.:279.0    1st Qu.:17.40    1st Qu.: 6.95
##    Median : 5.000    Median :330.0    Median :19.05    Median :11.36
##    Mean   : 9.549    Mean   :408.2    Mean   :18.46    Mean   :12.65
##    3rd Qu.:24.000    3rd Qu.:666.0    3rd Qu.:20.20    3rd Qu.:16.95
##    Max.   :24.000    Max.   :711.0    Max.   :22.00    Max.   :37.97
##        medv
##    Min.   : 5.00
##    1st Qu.:17.02
##    Median :21.20
##    Mean   :22.53
##    3rd Qu.:25.00
##    Max.   :50.00
```

Areas with High Crime Rates

```r
high_crime <- subset(Boston, Boston$crim > 3.5)
print(high_crime)
```

```
##            crim zn indus chas   nox    rm   age    dis rad tax ptratio lstat medv
## 144   4.09740  0 19.58    0 0.871 5.468 100.0 1.4118   5 403    14.7 26.42 15.6
## 156   3.53501  0 19.58    1 0.871 6.152  82.6 1.7455   5 403    14.7 15.02 15.6
## 357   8.98296  0 18.10    1 0.770 6.212  97.4 2.1222  24 666    20.2 17.60 17.8
## 358   3.84970  0 18.10    1 0.770 6.395  91.0 2.5052  24 666    20.2 13.27 21.7
## 359   5.20177  0 18.10    1 0.770 6.127  83.4 2.7227  24 666    20.2 11.48 22.7
## 360   4.26131  0 18.10    0 0.770 6.112  81.3 2.5091  24 666    20.2 12.67 22.6
## 361   4.54192  0 18.10    0 0.770 6.398  88.0 2.5182  24 666    20.2  7.79 25.0
## 362   3.83684  0 18.10    0 0.770 6.251  91.1 2.2955  24 666    20.2 14.19 19.9
## 363   3.67822  0 18.10    0 0.770 5.362  96.2 2.1036  24 666    20.2 10.19 20.8
## 364   4.22239  0 18.10    1 0.770 5.803  89.0 1.9047  24 666    20.2 14.64 16.8
## 366   4.55587  0 18.10    0 0.718 3.561  87.9 1.6132  24 666    20.2  7.12 27.5
## 367   3.69695  0 18.10    0 0.718 4.963  91.4 1.7523  24 666    20.2 14.00 21.9
## 368  13.52220  0 18.10    0 0.631 3.863 100.0 1.5106  24 666    20.2 13.33 23.1
## 369   4.89822  0 18.10    0 0.631 4.970 100.0 1.3325  24 666    20.2  3.26 50.0
## 370   5.66998  0 18.10    1 0.631 6.683  96.8 1.3567  24 666    20.2  3.73 50.0
## 371   6.53876  0 18.10    1 0.631 7.016  97.5 1.2024  24 666    20.2  2.96 50.0
## 372   9.23230  0 18.10    0 0.631 6.216 100.0 1.1691  24 666    20.2  9.53 50.0
## 373   8.26725  0 18.10    1 0.668 5.875  89.6 1.1296  24 666    20.2  8.88 50.0
## 374  11.10810  0 18.10    0 0.668 4.906 100.0 1.1742  24 666    20.2 34.77 13.8
## 375  18.49820  0 18.10    0 0.668 4.138 100.0 1.1370  24 666    20.2 37.97 13.8
```

```
## 376 19.60910  0 18.10    0 0.671 7.313  97.9 1.3163  24 666    20.2 13.44 15.0
## 377 15.28800  0 18.10    0 0.671 6.649  93.3 1.3449  24 666    20.2 23.24 13.9
## 378  9.82349  0 18.10    0 0.671 6.794  98.8 1.3580  24 666    20.2 21.24 13.3
## 379 23.64820  0 18.10    0 0.671 6.380  96.2 1.3861  24 666    20.2 23.69 13.1
## 380 17.86670  0 18.10    0 0.671 6.223 100.0 1.3861  24 666    20.2 21.78 10.2
## 381 88.97620  0 18.10    0 0.671 6.968  91.9 1.4165  24 666    20.2 17.21 10.4
## 382 15.87440  0 18.10    0 0.671 6.545  99.1 1.5192  24 666    20.2 21.08 10.9
## 383  9.18702  0 18.10    0 0.700 5.536 100.0 1.5804  24 666    20.2 23.60 11.3
## 384  7.99248  0 18.10    0 0.700 5.520 100.0 1.5331  24 666    20.2 24.56 12.3
## 385 20.08490  0 18.10    0 0.700 4.368  91.2 1.4395  24 666    20.2 30.63  8.8
## 386 16.81180  0 18.10    0 0.700 5.277  98.1 1.4261  24 666    20.2 30.81  7.2
## 387 24.39380  0 18.10    0 0.700 4.652 100.0 1.4672  24 666    20.2 28.28 10.5
## 388 22.59710  0 18.10    0 0.700 5.000  89.5 1.5184  24 666    20.2 31.99  7.4
## 389 14.33370  0 18.10    0 0.700 4.880 100.0 1.5895  24 666    20.2 30.62 10.2
## 390  8.15174  0 18.10    0 0.700 5.390  98.9 1.7281  24 666    20.2 20.85 11.5
## 391  6.96215  0 18.10    0 0.700 5.713  97.0 1.9265  24 666    20.2 17.11 15.1
## 392  5.29305  0 18.10    0 0.700 6.051  82.5 2.1678  24 666    20.2 18.76 23.2
## 393 11.57790  0 18.10    0 0.700 5.036  97.0 1.7700  24 666    20.2 25.68  9.7
## 394  8.64476  0 18.10    0 0.693 6.193  92.6 1.7912  24 666    20.2 15.17 13.8
## 395 13.35980  0 18.10    0 0.693 5.887  94.7 1.7821  24 666    20.2 16.35 12.7
## 396  8.71675  0 18.10    0 0.693 6.471  98.8 1.7257  24 666    20.2 17.12 13.1
## 397  5.87205  0 18.10    0 0.693 6.405  96.0 1.6768  24 666    20.2 19.37 12.5
## 398  7.67202  0 18.10    0 0.693 5.747  98.9 1.6334  24 666    20.2 19.92  8.5
## 399 38.35180  0 18.10    0 0.693 5.453 100.0 1.4896  24 666    20.2 30.59  5.0
## 400  9.91655  0 18.10    0 0.693 5.852  77.8 1.5004  24 666    20.2 29.97  6.3
## 401 25.04610  0 18.10    0 0.693 5.987 100.0 1.5888  24 666    20.2 26.77  5.6
## 402 14.23620  0 18.10    0 0.693 6.343 100.0 1.5741  24 666    20.2 20.32  7.2
## 403  9.59571  0 18.10    0 0.693 6.404 100.0 1.6390  24 666    20.2 20.31 12.1
## 404 24.80170  0 18.10    0 0.693 5.349  96.0 1.7028  24 666    20.2 19.77  8.3
## 405 41.52920  0 18.10    0 0.693 5.531  85.4 1.6074  24 666    20.2 27.38  8.5
## 406 67.92080  0 18.10    0 0.693 5.683 100.0 1.4254  24 666    20.2 22.98  5.0
## 407 20.71620  0 18.10    0 0.659 4.138 100.0 1.1781  24 666    20.2 23.34 11.9
## 408 11.95110  0 18.10    0 0.659 5.608 100.0 1.2852  24 666    20.2 12.13 27.9
## 409  7.40389  0 18.10    0 0.597 5.617  97.9 1.4547  24 666    20.2 26.40 17.2
## 410 14.43830  0 18.10    0 0.597 6.852 100.0 1.4655  24 666    20.2 19.78 27.5
## 411 51.13580  0 18.10    0 0.597 5.757 100.0 1.4130  24 666    20.2 10.11 15.0
## 412 14.05070  0 18.10    0 0.597 6.657 100.0 1.5275  24 666    20.2 21.22 17.2
## 413 18.81100  0 18.10    0 0.597 4.628 100.0 1.5539  24 666    20.2 34.37 17.9
## 414 28.65580  0 18.10    0 0.597 5.155 100.0 1.5894  24 666    20.2 20.08 16.3
## 415 45.74610  0 18.10    0 0.693 4.519 100.0 1.6582  24 666    20.2 36.98  7.0
## 416 18.08460  0 18.10    0 0.679 6.434 100.0 1.8347  24 666    20.2 29.05  7.2
## 417 10.83420  0 18.10    0 0.679 6.782  90.8 1.8195  24 666    20.2 25.79  7.5
## 418 25.94060  0 18.10    0 0.679 5.304  89.1 1.6475  24 666    20.2 26.64 10.4
## 419 73.53410  0 18.10    0 0.679 5.957 100.0 1.8026  24 666    20.2 20.62  8.8
## 420 11.81230  0 18.10    0 0.718 6.824  76.5 1.7940  24 666    20.2 22.74  8.4
## 421 11.08740  0 18.10    0 0.718 6.411 100.0 1.8589  24 666    20.2 15.02 16.7
## 422  7.02259  0 18.10    0 0.718 6.006  95.3 1.8746  24 666    20.2 15.70 14.2
## 423 12.04820  0 18.10    0 0.614 5.648  87.6 1.9512  24 666    20.2 14.10 20.8
## 424  7.05042  0 18.10    0 0.614 6.103  85.1 2.0218  24 666    20.2 23.29 13.4
## 425  8.79212  0 18.10    0 0.584 5.565  70.6 2.0635  24 666    20.2 17.16 11.7
## 426 15.86030  0 18.10    0 0.679 5.896  95.4 1.9096  24 666    20.2 24.39  8.3
## 427 12.24720  0 18.10    0 0.584 5.837  59.7 1.9976  24 666    20.2 15.69 10.2
## 428 37.66190  0 18.10    0 0.679 6.202  78.7 1.8629  24 666    20.2 14.52 10.9
## 429  7.36711  0 18.10    0 0.679 6.193  78.1 1.9356  24 666    20.2 21.52 11.0
```

```
## 430  9.33889  0 18.10   0 0.679 6.380  95.6 1.9682  24 666   20.2 24.08  9.5
## 431  8.49213  0 18.10   0 0.584 6.348  86.1 2.0527  24 666   20.2 17.64 14.5
## 432 10.06230  0 18.10   0 0.584 6.833  94.3 2.0882  24 666   20.2 19.69 14.1
## 433  6.44405  0 18.10   0 0.584 6.425  74.8 2.2004  24 666   20.2 12.03 16.1
## 434  5.58107  0 18.10   0 0.713 6.436  87.9 2.3158  24 666   20.2 16.22 14.3
## 435 13.91340  0 18.10   0 0.713 6.208  95.0 2.2222  24 666   20.2 15.17 11.7
## 436 11.16040  0 18.10   0 0.740 6.629  94.6 2.1247  24 666   20.2 23.27 13.4
## 437 14.42080  0 18.10   0 0.740 6.461  93.3 2.0026  24 666   20.2 18.05  9.6
## 438 15.17720  0 18.10   0 0.740 6.152 100.0 1.9142  24 666   20.2 26.45  8.7
## 439 13.67810  0 18.10   0 0.740 5.935  87.9 1.8206  24 666   20.2 34.02  8.4
## 440  9.39063  0 18.10   0 0.740 5.627  93.9 1.8172  24 666   20.2 22.88 12.8
## 441 22.05110  0 18.10   0 0.740 5.818  92.4 1.8662  24 666   20.2 22.11 10.5
## 442  9.72418  0 18.10   0 0.740 6.406  97.2 2.0651  24 666   20.2 19.52 17.1
## 443  5.66637  0 18.10   0 0.740 6.219 100.0 2.0048  24 666   20.2 16.59 18.4
## 444  9.96654  0 18.10   0 0.740 6.485 100.0 1.9784  24 666   20.2 18.85 15.4
## 445 12.80230  0 18.10   0 0.740 5.854  96.6 1.8956  24 666   20.2 23.79 10.8
## 446 10.67180  0 18.10   0 0.740 6.459  94.8 1.9879  24 666   20.2 23.98 11.8
## 447  6.28807  0 18.10   0 0.740 6.341  96.4 2.0720  24 666   20.2 17.79 14.9
## 448  9.92485  0 18.10   0 0.740 6.251  96.6 2.1980  24 666   20.2 16.44 12.6
## 449  9.32909  0 18.10   0 0.713 6.185  98.7 2.2616  24 666   20.2 18.13 14.1
## 450  7.52601  0 18.10   0 0.713 6.417  98.3 2.1850  24 666   20.2 19.31 13.0
## 451  6.71772  0 18.10   0 0.713 6.749  92.6 2.3236  24 666   20.2 17.44 13.4
## 452  5.44114  0 18.10   0 0.713 6.655  98.2 2.3552  24 666   20.2 17.73 15.2
## 453  5.09017  0 18.10   0 0.713 6.297  91.8 2.3682  24 666   20.2 17.27 16.1
## 454  8.24809  0 18.10   0 0.713 7.393  99.3 2.4527  24 666   20.2 16.74 17.8
## 455  9.51363  0 18.10   0 0.713 6.728  94.1 2.4961  24 666   20.2 18.71 14.9
## 456  4.75237  0 18.10   0 0.713 6.525  86.5 2.4358  24 666   20.2 18.13 14.1
## 457  4.66883  0 18.10   0 0.713 5.976  87.9 2.5806  24 666   20.2 19.01 12.7
## 458  8.20058  0 18.10   0 0.713 5.936  80.3 2.7792  24 666   20.2 16.94 13.5
## 459  7.75223  0 18.10   0 0.713 6.301  83.7 2.7831  24 666   20.2 16.23 14.9
## 460  6.80117  0 18.10   0 0.713 6.081  84.4 2.7175  24 666   20.2 14.70 20.0
## 461  4.81213  0 18.10   0 0.713 6.701  90.0 2.5975  24 666   20.2 16.42 16.4
## 462  3.69311  0 18.10   0 0.713 6.376  88.4 2.5671  24 666   20.2 14.65 17.7
## 463  6.65492  0 18.10   0 0.713 6.317  83.0 2.7344  24 666   20.2 13.99 19.5
## 464  5.82115  0 18.10   0 0.713 6.513  89.9 2.8016  24 666   20.2 10.29 20.2
## 465  7.83932  0 18.10   0 0.655 6.209  65.4 2.9634  24 666   20.2 13.22 21.4
## 467  3.77498  0 18.10   0 0.655 5.952  84.7 2.8715  24 666   20.2 17.15 19.0
## 468  4.42228  0 18.10   0 0.584 6.003  94.5 2.5403  24 666   20.2 21.32 19.1
## 469 15.57570  0 18.10   0 0.580 5.926  71.0 2.9084  24 666   20.2 18.13 19.1
## 470 13.07510  0 18.10   0 0.580 5.713  56.7 2.8237  24 666   20.2 14.76 20.1
## 471  4.34879  0 18.10   0 0.580 6.167  84.0 3.0334  24 666   20.2 16.29 19.9
## 472  4.03841  0 18.10   0 0.532 6.229  90.7 3.0993  24 666   20.2 12.87 19.6
## 473  3.56868  0 18.10   0 0.580 6.437  75.0 2.8965  24 666   20.2 14.36 23.2
## 474  4.64689  0 18.10   0 0.614 6.980  67.6 2.5329  24 666   20.2 11.66 29.8
## 475  8.05579  0 18.10   0 0.584 5.427  95.4 2.4298  24 666   20.2 18.14 13.8
## 476  6.39312  0 18.10   0 0.584 6.162  97.4 2.2060  24 666   20.2 24.10 13.3
## 477  4.87141  0 18.10   0 0.614 6.484  93.6 2.3053  24 666   20.2 18.68 16.7
## 478 15.02340  0 18.10   0 0.614 5.304  97.3 2.1007  24 666   20.2 24.91 12.0
## 479 10.23300  0 18.10   0 0.614 6.185  96.7 2.1705  24 666   20.2 18.03 14.6
## 480 14.33370  0 18.10   0 0.614 6.229  88.0 1.9512  24 666   20.2 13.11 21.4
## 481  5.82401  0 18.10   0 0.532 6.242  64.7 3.4242  24 666   20.2 10.74 23.0
## 482  5.70818  0 18.10   0 0.532 6.750  74.9 3.3317  24 666   20.2  7.74 23.7
## 483  5.73116  0 18.10   0 0.532 7.061  77.0 3.4106  24 666   20.2  7.01 25.0
## 486  3.67367  0 18.10   0 0.583 6.312  51.9 3.9917  24 666   20.2 10.58 21.2
```

```
## 487  5.69175  0 18.10     0 0.583 6.114  79.8 3.5459  24 666     20.2 14.98 19.1
## 488  4.83567  0 18.10     0 0.583 5.905  53.2 3.1523  24 666     20.2 11.45 20.6
```

The range of crime rates if from .00632 to 88.9762.

Areas with High Tax Rates

```
  high_tax <- subset(Boston, Boston$tax > 666)
  print(high_tax)
```

```
##          crim zn indus chas   nox    rm  age    dis rad tax ptratio lstat medv
## 489 0.15086  0 27.74     0 0.609 5.454 92.7 1.8209   4 711    20.1 18.06 15.2
## 490 0.18337  0 27.74     0 0.609 5.414 98.3 1.7554   4 711    20.1 23.97  7.0
## 491 0.20746  0 27.74     0 0.609 5.093 98.0 1.8226   4 711    20.1 29.68  8.1
## 492 0.10574  0 27.74     0 0.609 5.983 98.8 1.8681   4 711    20.1 18.07 13.6
## 493 0.11132  0 27.74     0 0.609 5.983 83.5 2.1099   4 711    20.1 13.35 20.1
```

The range of crime rates if from 187.0 711.

Areas with Pupil:Teacher Ratios

```
  high_pt <- subset(Boston, Boston$ptratio > 20.2)
  print(high_pt)
```

```
##          crim zn indus chas   nox    rm   age    dis rad tax ptratio lstat medv
## 14  0.62976  0  8.14     0 0.538 5.949  61.8 4.7075   4 307    21.0  8.26 20.4
## 15  0.63796  0  8.14     0 0.538 6.096  84.5 4.4619   4 307    21.0 10.26 18.2
## 16  0.62739  0  8.14     0 0.538 5.834  56.5 4.4986   4 307    21.0  8.47 19.9
## 17  1.05393  0  8.14     0 0.538 5.935  29.3 4.4986   4 307    21.0  6.58 23.1
## 18  0.78420  0  8.14     0 0.538 5.990  81.7 4.2579   4 307    21.0 14.67 17.5
## 19  0.80271  0  8.14     0 0.538 5.456  36.6 3.7965   4 307    21.0 11.69 20.2
## 20  0.72580  0  8.14     0 0.538 5.727  69.5 3.7965   4 307    21.0 11.28 18.2
## 21  1.25179  0  8.14     0 0.538 5.570  98.1 3.7979   4 307    21.0 21.02 13.6
## 22  0.85204  0  8.14     0 0.538 5.965  89.2 4.0123   4 307    21.0 13.83 19.6
## 23  1.23247  0  8.14     0 0.538 6.142  91.7 3.9769   4 307    21.0 18.72 15.2
## 24  0.98843  0  8.14     0 0.538 5.813 100.0 4.0952   4 307    21.0 19.88 14.5
## 25  0.75026  0  8.14     0 0.538 5.924  94.1 4.3996   4 307    21.0 16.30 15.6
## 26  0.84054  0  8.14     0 0.538 5.599  85.7 4.4546   4 307    21.0 16.51 13.9
## 27  0.67191  0  8.14     0 0.538 5.813  90.3 4.6820   4 307    21.0 14.81 16.6
## 28  0.95577  0  8.14     0 0.538 6.047  88.8 4.4534   4 307    21.0 17.28 14.8
## 29  0.77299  0  8.14     0 0.538 6.495  94.4 4.4547   4 307    21.0 12.80 18.4
## 30  1.00245  0  8.14     0 0.538 6.674  87.3 4.2390   4 307    21.0 11.98 21.0
## 31  1.13081  0  8.14     0 0.538 5.713  94.1 4.2330   4 307    21.0 22.60 12.7
## 32  1.35472  0  8.14     0 0.538 6.072 100.0 4.1750   4 307    21.0 13.04 14.5
## 33  1.38799  0  8.14     0 0.538 5.950  82.0 3.9900   4 307    21.0 27.71 13.2
## 34  1.15172  0  8.14     0 0.538 5.701  95.0 3.7872   4 307    21.0 18.35 13.1
## 35  1.61282  0  8.14     0 0.538 6.096  96.9 3.7598   4 307    21.0 20.34 13.5
## 55  0.01360 75  4.00     0 0.410 5.888  47.6 7.3197   3 469    21.1 14.80 18.9
## 101 0.14866  0  8.56     0 0.520 6.727  79.9 2.7778   5 384    20.9  9.42 27.5
## 102 0.11432  0  8.56     0 0.520 6.781  71.3 2.8561   5 384    20.9  7.67 26.5
## 103 0.22876  0  8.56     0 0.520 6.405  85.4 2.7147   5 384    20.9 10.63 18.6
## 104 0.21161  0  8.56     0 0.520 6.137  87.4 2.7147   5 384    20.9 13.44 19.3
## 105 0.13960  0  8.56     0 0.520 6.167  90.0 2.4210   5 384    20.9 12.33 20.1
```

```
## 106 0.13262  0  8.56    0 0.520 5.851  96.7  2.1069   5 384    20.9 16.47 19.5
## 107 0.17120  0  8.56    0 0.520 5.836  91.9  2.2110   5 384    20.9 18.66 19.5
## 108 0.13117  0  8.56    0 0.520 6.127  85.2  2.1224   5 384    20.9 14.09 20.4
## 109 0.12802  0  8.56    0 0.520 6.474  97.1  2.4329   5 384    20.9 12.27 19.8
## 110 0.26363  0  8.56    0 0.520 6.229  91.2  2.5451   5 384    20.9 15.55 19.4
## 111 0.10793  0  8.56    0 0.520 6.195  54.4  2.7778   5 384    20.9 13.00 21.7
## 128 0.25915  0 21.89    0 0.624 5.693  96.0  1.7883   4 437    21.2 17.19 16.2
## 129 0.32543  0 21.89    0 0.624 6.431  98.8  1.8125   4 437    21.2 15.39 18.0
## 130 0.88125  0 21.89    0 0.624 5.637  94.7  1.9799   4 437    21.2 18.34 14.3
## 131 0.34006  0 21.89    0 0.624 6.458  98.9  2.1185   4 437    21.2 12.60 19.2
## 132 1.19294  0 21.89    0 0.624 6.326  97.7  2.2710   4 437    21.2 12.26 19.6
## 133 0.59005  0 21.89    0 0.624 6.372  97.9  2.3274   4 437    21.2 11.12 23.0
## 134 0.32982  0 21.89    0 0.624 5.822  95.4  2.4699   4 437    21.2 15.03 18.4
## 135 0.97617  0 21.89    0 0.624 5.757  98.4  2.3460   4 437    21.2 17.31 15.6
## 136 0.55778  0 21.89    0 0.624 6.335  98.2  2.1107   4 437    21.2 16.96 18.1
## 137 0.32264  0 21.89    0 0.624 5.942  93.5  1.9669   4 437    21.2 16.90 17.4
## 138 0.35233  0 21.89    0 0.624 6.454  98.4  1.8498   4 437    21.2 14.59 17.1
## 139 0.24980  0 21.89    0 0.624 5.857  98.2  1.6686   4 437    21.2 21.32 13.3
## 140 0.54452  0 21.89    0 0.624 6.151  97.9  1.6687   4 437    21.2 18.46 17.8
## 141 0.29090  0 21.89    0 0.624 6.174  93.6  1.6119   4 437    21.2 24.16 14.0
## 142 1.62864  0 21.89    0 0.624 5.019 100.0  1.4394   4 437    21.2 34.41 14.4
## 355 0.04301 80  1.91    0 0.413 5.663  21.9 10.5857   4 334    22.0  8.05 18.2
## 356 0.10659 80  1.91    0 0.413 5.936  19.5 10.5857   4 334    22.0  5.57 20.6
## 502 0.06263  0 11.93    0 0.573 6.593  69.1  2.4786   1 273    21.0  9.67 22.4
## 503 0.04527  0 11.93    0 0.573 6.120  76.7  2.2875   1 273    21.0  9.08 20.6
## 504 0.06076  0 11.93    0 0.573 6.976  91.0  2.1675   1 273    21.0  5.64 23.9
## 505 0.10959  0 11.93    0 0.573 6.794  89.3  2.3889   1 273    21.0  6.48 22.0
## 506 0.04741  0 11.93    0 0.573 6.030  80.8  2.5050   1 273    21.0  7.88 11.9
```

The range of crime rates if from 12.6 to 22.

Areas that border the Charles river

```
  river_side <- subset(Boston, Boston$chas == 1)
  print(river_side)
```

```
##          crim zn indus chas    nox    rm   age    dis rad tax ptratio lstat medv
## 143 3.32105  0 19.58    1 0.8710 5.403 100.0 1.3216   5 403    14.7 26.82 13.4
## 153 1.12658  0 19.58    1 0.8710 5.012  88.0 1.6102   5 403    14.7 12.12 15.3
## 155 1.41385  0 19.58    1 0.8710 6.129  96.0 1.7494   5 403    14.7 15.12 17.0
## 156 3.53501  0 19.58    1 0.8710 6.152  82.6 1.7455   5 403    14.7 15.02 15.6
## 161 1.27346  0 19.58    1 0.6050 6.250  92.6 1.7984   5 403    14.7  5.50 27.0
## 163 1.83377  0 19.58    1 0.6050 7.802  98.2 2.0407   5 403    14.7  1.92 50.0
## 164 1.51902  0 19.58    1 0.6050 8.375  93.9 2.1620   5 403    14.7  3.32 50.0
## 209 0.13587  0 10.59    1 0.4890 6.064  59.1 4.2392   4 277    18.6 14.66 24.4
## 210 0.43571  0 10.59    1 0.4890 5.344 100.0 3.8750   4 277    18.6 23.09 20.0
## 211 0.17446  0 10.59    1 0.4890 5.960  92.1 3.8771   4 277    18.6 17.27 21.7
## 212 0.37578  0 10.59    1 0.4890 5.404  88.6 3.6650   4 277    18.6 23.98 19.3
## 213 0.21719  0 10.59    1 0.4890 5.807  53.8 3.6526   4 277    18.6 16.03 22.4
## 217 0.04560  0 13.89    1 0.5500 5.888  56.0 3.1121   5 276    16.4 13.51 23.3
## 219 0.11069  0 13.89    1 0.5500 5.951  93.8 2.8893   5 276    16.4 17.92 21.5
## 220 0.11425  0 13.89    1 0.5500 6.373  92.4 3.3633   5 276    16.4 10.50 23.0
## 221 0.35809  0  6.20    1 0.5070 6.951  88.5 2.8617   8 307    17.4  9.71 26.7
## 222 0.40771  0  6.20    1 0.5070 6.164  91.3 3.0480   8 307    17.4 21.46 21.7
```

```
## 223 0.62356  0  6.20    1 0.5070 6.879  77.7 3.2721   8 307   17.4  9.93 27.5
## 235 0.44791  0  6.20    1 0.5070 6.726  66.5 3.6519   8 307   17.4  8.05 29.0
## 237 0.52058  0  6.20    1 0.5070 6.631  76.5 4.1480   8 307   17.4  9.54 25.1
## 270 0.09065 20  6.96    1 0.4640 5.920  61.5 3.9175   3 223   18.6 13.65 20.7
## 274 0.22188 20  6.96    1 0.4640 7.691  51.8 4.3665   3 223   18.6  6.58 35.2
## 275 0.05644 40  6.41    1 0.4470 6.758  32.9 4.0776   4 254   17.6  3.53 32.4
## 277 0.10469 40  6.41    1 0.4470 7.267  49.0 4.7872   4 254   17.6  6.05 33.2
## 278 0.06127 40  6.41    1 0.4470 6.826  27.6 4.8628   4 254   17.6  4.16 33.1
## 283 0.06129 20  3.33    1 0.4429 7.645  49.7 5.2119   5 216   14.9  3.01 46.0
## 284 0.01501 90  1.21    1 0.4010 7.923  24.8 5.8850   1 198   13.6  3.16 50.0
## 357 8.98296  0 18.10    1 0.7700 6.212  97.4 2.1222  24 666   20.2 17.60 17.8
## 358 3.84970  0 18.10    1 0.7700 6.395  91.0 2.5052  24 666   20.2 13.27 21.7
## 359 5.20177  0 18.10    1 0.7700 6.127  83.4 2.7227  24 666   20.2 11.48 22.7
## 364 4.22239  0 18.10    1 0.7700 5.803  89.0 1.9047  24 666   20.2 14.64 16.8
## 365 3.47428  0 18.10    1 0.7180 8.780  82.9 1.9047  24 666   20.2  5.29 21.9
## 370 5.66998  0 18.10    1 0.6310 6.683  96.8 1.3567  24 666   20.2  3.73 50.0
## 371 6.53876  0 18.10    1 0.6310 7.016  97.5 1.2024  24 666   20.2  2.96 50.0
## 373 8.26725  0 18.10    1 0.6680 5.875  89.6 1.1296  24 666   20.2  8.88 50.0
```

There are 35 suburbs that bound the Charles river.

```
summary(Boston)
```

```
##      crim                zn            indus            chas
##  Min.   : 0.00632   Min.   :  0.00   Min.   : 0.46   Min.   :0.00000
##  1st Qu.: 0.08205   1st Qu.:  0.00   1st Qu.: 5.19   1st Qu.:0.00000
##  Median : 0.25651   Median :  0.00   Median : 9.69   Median :0.00000
##  Mean   : 3.61352   Mean   : 11.36   Mean   :11.14   Mean   :0.06917
##  3rd Qu.: 3.67708   3rd Qu.: 12.50   3rd Qu.:18.10   3rd Qu.:0.00000
##  Max.   :88.97620   Max.   :100.00   Max.   :27.74   Max.   :1.00000
##      nox               rm            age             dis
##  Min.   :0.3850   Min.   :3.561   Min.   :  2.90   Min.   : 1.130
##  1st Qu.:0.4490   1st Qu.:5.886   1st Qu.: 45.02   1st Qu.: 2.100
##  Median :0.5380   Median :6.208   Median : 77.50   Median : 3.207
##  Mean   :0.5547   Mean   :6.285   Mean   : 68.57   Mean   : 3.795
##  3rd Qu.:0.6240   3rd Qu.:6.623   3rd Qu.: 94.08   3rd Qu.: 5.188
##  Max.   :0.8710   Max.   :8.780   Max.   :100.00   Max.   :12.127
##      rad              tax           ptratio          lstat
##  Min.   : 1.000   Min.   :187.0   Min.   :12.60   Min.   : 1.73
##  1st Qu.: 4.000   1st Qu.:279.0   1st Qu.:17.40   1st Qu.: 6.95
##  Median : 5.000   Median :330.0   Median :19.05   Median :11.36
##  Mean   : 9.549   Mean   :408.2   Mean   :18.46   Mean   :12.65
##  3rd Qu.:24.000   3rd Qu.:666.0   3rd Qu.:20.20   3rd Qu.:16.95
##  Max.   :24.000   Max.   :711.0   Max.   :22.00   Max.   :37.97
##      medv
##  Min.   : 5.00
##  1st Qu.:17.02
##  Median :21.20
##  Mean   :22.53
##  3rd Qu.:25.00
##  Max.   :50.00
```

The median pupil:teacher ratio is 19.05.

Areas with Lowest Home Value

```
lowest <- subset(Boston, Boston$medv == 5)
print(lowest)
```

```
##         crim zn indus chas   nox    rm age    dis rad tax ptratio lstat medv
## 399 38.3518  0  18.1    0 0.693 5.453 100 1.4896  24 666    20.2 30.59    5
## 406 67.9208  0  18.1    0 0.693 5.683 100 1.4254  24 666    20.2 22.98    5
```

Both of the areas with lowest home values have extremely higher crime rates as well as identaical percentages
of land with industrail use. They both have the same nitrogen oxside concentration and percentage of units
that were build before 1940. Their predictors across the board are either equal or within in spitting distance
of each other. This leads me to include if they are so similar they most likely are next to each other.

```
rooms <- subset(Boston, Boston$rm > 7)
print(rooms)
```

```
##          crim   zn indus chas   nox    rm  age    dis rad tax ptratio lstat
## 3     0.02729  0.0  7.07    0 0.4690 7.185 61.1 4.9671   2 242    17.8  4.03
## 5     0.06905  0.0  2.18    0 0.4580 7.147 54.2 6.0622   3 222    18.7  5.33
## 41    0.03359 75.0  2.95    0 0.4280 7.024 15.8 5.4011   3 252    18.3  1.98
## 56    0.01311 90.0  1.22    0 0.4030 7.249 21.9 8.6966   5 226    17.9  4.81
## 65    0.01951 17.5  1.38    0 0.4161 7.104 59.5 9.2229   3 216    18.6  8.05
## 89    0.05660  0.0  3.41    0 0.4890 7.007 86.3 3.4217   2 270    17.8  5.50
## 90    0.05302  0.0  3.41    0 0.4890 7.079 63.1 3.4145   2 270    17.8  5.70
## 98    0.12083  0.0  2.89    0 0.4450 8.069 76.0 3.4952   2 276    18.0  4.21
## 99    0.08187  0.0  2.89    0 0.4450 7.820 36.9 3.4952   2 276    18.0  3.57
## 100   0.06860  0.0  2.89    0 0.4450 7.416 62.5 3.4952   2 276    18.0  6.19
## 162   1.46336  0.0 19.58    0 0.6050 7.489 90.8 1.9709   5 403    14.7  1.73
## 163   1.83377  0.0 19.58    1 0.6050 7.802 98.2 2.0407   5 403    14.7  1.92
## 164   1.51902  0.0 19.58    1 0.6050 8.375 93.9 2.1620   5 403    14.7  3.32
## 167   2.01019  0.0 19.58    0 0.6050 7.929 96.2 2.0459   5 403    14.7  3.70
## 181   0.06588  0.0  2.46    0 0.4880 7.765 83.3 2.7410   3 193    17.8  7.56
## 183   0.09103  0.0  2.46    0 0.4880 7.155 92.2 2.7006   3 193    17.8  4.82
## 187   0.05602  0.0  2.46    0 0.4880 7.831 53.6 3.1992   3 193    17.8  4.45
## 190   0.08370 45.0  3.44    0 0.4370 7.185 38.9 4.5667   5 398    15.2  5.39
## 193   0.08664 45.0  3.44    0 0.4370 7.178 26.3 6.4798   5 398    15.2  2.87
## 196   0.01381 80.0  0.46    0 0.4220 7.875 32.0 5.6484   4 255    14.4  2.97
## 197   0.04011 80.0  1.52    0 0.4040 7.287 34.1 7.3090   2 329    12.6  4.08
## 198   0.04666 80.0  1.52    0 0.4040 7.107 36.6 7.3090   2 329    12.6  8.61
## 199   0.03768 80.0  1.52    0 0.4040 7.274 38.3 7.3090   2 329    12.6  6.62
## 201   0.01778 95.0  1.47    0 0.4030 7.135 13.9 7.6534   3 402    17.0  4.45
## 203   0.02177 82.5  2.03    0 0.4150 7.610 15.7 6.2700   2 348    14.7  3.11
## 204   0.03510 95.0  2.68    0 0.4161 7.853 33.2 5.1180   4 224    14.7  3.81
## 205   0.02009 95.0  2.68    0 0.4161 8.034 31.9 5.1180   4 224    14.7  2.88
## 225   0.31533  0.0  6.20    0 0.5040 8.266 78.3 2.8944   8 307    17.4  4.14
## 226   0.52693  0.0  6.20    0 0.5040 8.725 83.0 2.8944   8 307    17.4  4.63
## 227   0.38214  0.0  6.20    0 0.5040 8.040 86.5 3.2157   8 307    17.4  3.13
## 228   0.41238  0.0  6.20    0 0.5040 7.163 79.9 3.2157   8 307    17.4  6.36
## 229   0.29819  0.0  6.20    0 0.5040 7.686 17.0 3.3751   8 307    17.4  3.92
## 232   0.46296  0.0  6.20    0 0.5040 7.412 76.9 3.6715   8 307    17.4  5.25
## 233   0.57529  0.0  6.20    0 0.5070 8.337 73.3 3.8384   8 307    17.4  2.47
## 234   0.33147  0.0  6.20    0 0.5070 8.247 70.4 3.6519   8 307    17.4  3.95
```

```
## 238  0.51183  0.0  6.20   0 0.5070 7.358  71.6 4.1480  8 307  17.4  4.73
## 254  0.36894 22.0  5.86   0 0.4310 8.259   8.4 8.9067  7 330  19.1  3.54
## 257  0.01538 90.0  3.75   0 0.3940 7.454  34.2 6.3361  3 244  15.9  3.11
## 258  0.61154 20.0  3.97   0 0.6470 8.704  86.9 1.8010  5 264  13.0  5.12
## 259  0.66351 20.0  3.97   0 0.6470 7.333 100.0 1.8946  5 264  13.0  7.79
## 261  0.54011 20.0  3.97   0 0.6470 7.203  81.8 2.1121  5 264  13.0  9.59
## 262  0.53412 20.0  3.97   0 0.6470 7.520  89.4 2.1398  5 264  13.0  7.26
## 263  0.52014 20.0  3.97   0 0.6470 8.398  91.5 2.2885  5 264  13.0  5.91
## 264  0.82526 20.0  3.97   0 0.6470 7.327  94.5 2.0788  5 264  13.0 11.25
## 265  0.55007 20.0  3.97   0 0.6470 7.206  91.6 1.9301  5 264  13.0  8.10
## 267  0.78570 20.0  3.97   0 0.6470 7.014  84.6 2.1329  5 264  13.0 14.79
## 268  0.57834 20.0  3.97   0 0.5750 8.297  67.0 2.4216  5 264  13.0  7.44
## 269  0.54050 20.0  3.97   0 0.5750 7.470  52.6 2.8720  5 264  13.0  3.16
## 274  0.22188 20.0  6.96   1 0.4640 7.691  51.8 4.3665  3 223  18.6  6.58
## 277  0.10469 40.0  6.41   1 0.4470 7.267  49.0 4.7872  4 254  17.6  6.05
## 281  0.03578 20.0  3.33   0 0.4429 7.820  64.5 4.6947  5 216  14.9  3.76
## 283  0.06129 20.0  3.33   1 0.4429 7.645  49.7 5.2119  5 216  14.9  3.01
## 284  0.01501 90.0  1.21   1 0.4010 7.923  24.8 5.8850  1 198  13.6  3.16
## 285  0.00906 90.0  2.97   0 0.4000 7.088  20.8 7.3073  1 285  15.3  7.85
## 292  0.07886 80.0  4.95   0 0.4110 7.148  27.7 5.1167  4 245  19.2  3.56
## 300  0.05561 70.0  2.24   0 0.4000 7.041  10.0 7.8278  5 358  14.8  4.74
## 305  0.05515 33.0  2.18   0 0.4720 7.236  41.1 4.0220  7 222  18.4  6.93
## 307  0.07503 33.0  2.18   0 0.4720 7.420  71.9 3.0992  7 222  18.4  6.47
## 342  0.01301 35.0  1.52   0 0.4420 7.241  49.3 7.0379  1 284  15.5  5.49
## 365  3.47428  0.0 18.10   1 0.7180 8.780  82.9 1.9047 24 666  20.2  5.29
## 371  6.53876  0.0 18.10   1 0.6310 7.016  97.5 1.2024 24 666  20.2  2.96
## 376 19.60910  0.0 18.10   0 0.6710 7.313  97.9 1.3163 24 666  20.2 13.44
## 454  8.24809  0.0 18.10   0 0.7130 7.393  99.3 2.4527 24 666  20.2 16.74
## 483  5.73116  0.0 18.10   0 0.5320 7.061  77.0 3.4106 24 666  20.2  7.01
##      medv
## 3    34.7
## 5    36.2
## 41   34.9
## 56   35.4
## 65   33.0
## 89   23.6
## 90   28.7
## 98   38.7
## 99   43.8
## 100  33.2
## 162  50.0
## 163  50.0
## 164  50.0
## 167  50.0
## 181  39.8
## 183  37.9
## 187  50.0
## 190  34.9
## 193  36.4
## 196  50.0
## 197  33.3
## 198  30.3
## 199  34.6
## 201  32.9
```

```
## 203 42.3
## 204 48.5
## 205 50.0
## 225 44.8
## 226 50.0
## 227 37.6
## 228 31.6
## 229 46.7
## 232 31.7
## 233 41.7
## 234 48.3
## 238 31.5
## 254 42.8
## 257 44.0
## 258 50.0
## 259 36.0
## 261 33.8
## 262 43.1
## 263 48.8
## 264 31.0
## 265 36.5
## 267 30.7
## 268 50.0
## 269 43.5
## 274 35.2
## 277 33.2
## 281 45.4
## 283 46.0
## 284 50.0
## 285 32.2
## 292 37.3
## 300 29.0
## 305 36.1
## 307 33.4
## 342 32.7
## 365 21.9
## 371 50.0
## 376 15.0
## 454 17.8
## 483 25.0
```

```r
room_8 <- subset(Boston, Boston$rm > 8)
print(room_8)
```

```
##           crim zn indus chas    nox    rm  age    dis rad tax ptratio lstat medv
## 98   0.12083  0  2.89    0 0.4450 8.069 76.0 3.4952   2 276    18.0  4.21 38.7
## 164  1.51902  0 19.58    1 0.6050 8.375 93.9 2.1620   5 403    14.7  3.32 50.0
## 205  0.02009 95  2.68    0 0.4161 8.034 31.9 5.1180   4 224    14.7  2.88 50.0
## 225  0.31533  0  6.20    0 0.5040 8.266 78.3 2.8944   8 307    17.4  4.14 44.8
## 226  0.52693  0  6.20    0 0.5040 8.725 83.0 2.8944   8 307    17.4  4.63 50.0
## 227  0.38214  0  6.20    0 0.5040 8.040 86.5 3.2157   8 307    17.4  3.13 37.6
## 233  0.57529  0  6.20    0 0.5070 8.337 73.3 3.8384   8 307    17.4  2.47 41.7
## 234  0.33147  0  6.20    0 0.5070 8.247 70.4 3.6519   8 307    17.4  3.95 48.3
## 254  0.36894 22  5.86    0 0.4310 8.259  8.4 8.9067   7 330    19.1  3.54 42.8
```

```
## 258 0.61154 20  3.97     0 0.6470 8.704 86.9 1.8010   5 264    13.0  5.12 50.0
## 263 0.52014 20  3.97     0 0.6470 8.398 91.5 2.2885   5 264    13.0  5.91 48.8
## 268 0.57834 20  3.97     0 0.5750 8.297 67.0 2.4216   5 264    13.0  7.44 50.0
## 365 3.47428  0 18.10     1 0.7180 8.780 82.9 1.9047  24 666    20.2  5.29 21.9
```

13 suburbs have an average number of rooms per dwelling above 7. These are probably areas with lots of apartments and high density housing.