RWorksheet_Huervana#4c

2023-10-04

1. Use the dataset mpg

1A. Show your solutions on how to import a csv file into the environment

```
mpg <- read.csv(file = "mpg.csv", header = T, sep = ",")
mpg
```

```
##       X manufacturer                model displ year cyl      trans drv cty
## 1     1         audi                   a4   1.8 1999   4   auto(l5)   f  18
## 2     2         audi                   a4   1.8 1999   4 manual(m5)   f  21
## 3     3         audi                   a4   2.0 2008   4 manual(m6)   f  20
## 4     4         audi                   a4   2.0 2008   4   auto(av)   f  21
## 5     5         audi                   a4   2.8 1999   6   auto(l5)   f  16
## 6     6         audi                   a4   2.8 1999   6 manual(m5)   f  18
## 7     7         audi                   a4   3.1 2008   6   auto(av)   f  18
## 8     8         audi             a4 quattro   1.8 1999   4 manual(m5)   4  18
## 9     9         audi             a4 quattro   1.8 1999   4   auto(l5)   4  16
## 10   10         audi             a4 quattro   2.0 2008   4 manual(m6)   4  20
## 11   11         audi             a4 quattro   2.0 2008   4   auto(s6)   4  19
## 12   12         audi             a4 quattro   2.8 1999   6   auto(l5)   4  15
## 13   13         audi             a4 quattro   2.8 1999   6 manual(m5)   4  17
## 14   14         audi             a4 quattro   3.1 2008   6   auto(s6)   4  17
## 15   15         audi             a4 quattro   3.1 2008   6 manual(m6)   4  15
## 16   16         audi             a6 quattro   2.8 1999   6   auto(l5)   4  15
## 17   17         audi             a6 quattro   3.1 2008   6   auto(s6)   4  17
## 18   18         audi             a6 quattro   4.2 2008   8   auto(s6)   4  16
## 19   19    chevrolet     c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  14
## 20   20    chevrolet     c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  11
## 21   21    chevrolet     c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  14
## 22   22    chevrolet     c1500 suburban 2wd   5.7 1999   8   auto(l4)   r  13
## 23   23    chevrolet     c1500 suburban 2wd   6.0 2008   8   auto(l4)   r  12
## 24   24    chevrolet              corvette   5.7 1999   8 manual(m6)   r  16
## 25   25    chevrolet              corvette   5.7 1999   8   auto(l4)   r  15
## 26   26    chevrolet              corvette   6.2 2008   8 manual(m6)   r  16
## 27   27    chevrolet              corvette   6.2 2008   8   auto(s6)   r  15
## 28   28    chevrolet              corvette   7.0 2008   8 manual(m6)   r  15
## 29   29    chevrolet        k1500 tahoe 4wd   5.3 2008   8   auto(l4)   4  14
## 30   30    chevrolet        k1500 tahoe 4wd   5.3 2008   8   auto(l4)   4  11
## 31   31    chevrolet        k1500 tahoe 4wd   5.7 1999   8   auto(l4)   4  11
## 32   32    chevrolet        k1500 tahoe 4wd   6.5 1999   8   auto(l4)   4  14
## 33   33    chevrolet                malibu   2.4 1999   4   auto(l4)   f  19
## 34   34    chevrolet                malibu   2.4 2008   4   auto(l4)   f  22
## 35   35    chevrolet                malibu   3.1 1999   6   auto(l4)   f  18
## 36   36    chevrolet                malibu   3.5 2008   6   auto(l4)   f  18
## 37   37    chevrolet                malibu   3.6 2008   6   auto(s6)   f  17
## 38   38        dodge            caravan 2wd   2.4 1999   4   auto(l3)   f  18
## 39   39        dodge            caravan 2wd   3.0 1999   6   auto(l4)   f  17
```

```
## 40   40        dodge            caravan 2wd   3.3 1999   6   auto(l4)   f  16
## 41   41        dodge            caravan 2wd   3.3 1999   6   auto(l4)   f  16
## 42   42        dodge            caravan 2wd   3.3 2008   6   auto(l4)   f  17
## 43   43        dodge            caravan 2wd   3.3 2008   6   auto(l4)   f  17
## 44   44        dodge            caravan 2wd   3.3 2008   6   auto(l4)   f  11
## 45   45        dodge            caravan 2wd   3.8 1999   6   auto(l4)   f  15
## 46   46        dodge            caravan 2wd   3.8 1999   6   auto(l4)   f  15
## 47   47        dodge            caravan 2wd   3.8 2008   6   auto(l6)   f  16
## 48   48        dodge            caravan 2wd   4.0 2008   6   auto(l6)   f  16
## 49   49        dodge      dakota pickup 4wd   3.7 2008   6 manual(m6)   4  15
## 50   50        dodge      dakota pickup 4wd   3.7 2008   6   auto(l4)   4  14
## 51   51        dodge      dakota pickup 4wd   3.9 1999   6   auto(l4)   4  13
## 52   52        dodge      dakota pickup 4wd   3.9 1999   6 manual(m5)   4  14
## 53   53        dodge      dakota pickup 4wd   4.7 2008   8   auto(l5)   4  14
## 54   54        dodge      dakota pickup 4wd   4.7 2008   8   auto(l5)   4  14
## 55   55        dodge      dakota pickup 4wd   4.7 2008   8   auto(l5)   4   9
## 56   56        dodge      dakota pickup 4wd   5.2 1999   8 manual(m5)   4  11
## 57   57        dodge      dakota pickup 4wd   5.2 1999   8   auto(l4)   4  11
## 58   58        dodge            durango 4wd   3.9 1999   6   auto(l4)   4  13
## 59   59        dodge            durango 4wd   4.7 2008   8   auto(l5)   4  13
## 60   60        dodge            durango 4wd   4.7 2008   8   auto(l5)   4   9
## 61   61        dodge            durango 4wd   4.7 2008   8   auto(l5)   4  13
## 62   62        dodge            durango 4wd   5.2 1999   8   auto(l4)   4  11
## 63   63        dodge            durango 4wd   5.7 2008   8   auto(l5)   4  13
## 64   64        dodge            durango 4wd   5.9 1999   8   auto(l4)   4  11
## 65   65        dodge    ram 1500 pickup 4wd   4.7 2008   8 manual(m6)   4  12
## 66   66        dodge    ram 1500 pickup 4wd   4.7 2008   8   auto(l5)   4   9
## 67   67        dodge    ram 1500 pickup 4wd   4.7 2008   8   auto(l5)   4  13
## 68   68        dodge    ram 1500 pickup 4wd   4.7 2008   8   auto(l5)   4  13
## 69   69        dodge    ram 1500 pickup 4wd   4.7 2008   8 manual(m6)   4  12
## 70   70        dodge    ram 1500 pickup 4wd   4.7 2008   8 manual(m6)   4   9
## 71   71        dodge    ram 1500 pickup 4wd   5.2 1999   8   auto(l4)   4  11
## 72   72        dodge    ram 1500 pickup 4wd   5.2 1999   8 manual(m5)   4  11
## 73   73        dodge    ram 1500 pickup 4wd   5.7 2008   8   auto(l5)   4  13
## 74   74        dodge    ram 1500 pickup 4wd   5.9 1999   8   auto(l4)   4  11
## 75   75         ford         expedition 2wd   4.6 1999   8   auto(l4)   r  11
## 76   76         ford         expedition 2wd   5.4 1999   8   auto(l4)   r  11
## 77   77         ford         expedition 2wd   5.4 2008   8   auto(l6)   r  12
## 78   78         ford           explorer 4wd   4.0 1999   6   auto(l5)   4  14
## 79   79         ford           explorer 4wd   4.0 1999   6 manual(m5)   4  15
## 80   80         ford           explorer 4wd   4.0 1999   6   auto(l5)   4  14
## 81   81         ford           explorer 4wd   4.0 2008   6   auto(l5)   4  13
## 82   82         ford           explorer 4wd   4.6 2008   8   auto(l6)   4  13
## 83   83         ford           explorer 4wd   5.0 1999   8   auto(l4)   4  13
## 84   84         ford        f150 pickup 4wd   4.2 1999   6   auto(l4)   4  14
## 85   85         ford        f150 pickup 4wd   4.2 1999   6 manual(m5)   4  14
## 86   86         ford        f150 pickup 4wd   4.6 1999   8 manual(m5)   4  13
## 87   87         ford        f150 pickup 4wd   4.6 1999   8   auto(l4)   4  13
## 88   88         ford        f150 pickup 4wd   4.6 2008   8   auto(l4)   4  13
## 89   89         ford        f150 pickup 4wd   5.4 1999   8   auto(l4)   4  11
## 90   90         ford        f150 pickup 4wd   5.4 2008   8   auto(l4)   4  13
## 91   91         ford                mustang   3.8 1999   6 manual(m5)   r  18
## 92   92         ford                mustang   3.8 1999   6   auto(l4)   r  18
## 93   93         ford                mustang   4.0 2008   6 manual(m5)   r  17
```

```
## 94   94         ford               mustang   4.0 2008   6   auto(l5)   r  16
## 95   95         ford               mustang   4.6 1999   8   auto(l4)   r  15
## 96   96         ford               mustang   4.6 1999   8 manual(m5)   r  15
## 97   97         ford               mustang   4.6 2008   8 manual(m5)   r  15
## 98   98         ford               mustang   4.6 2008   8   auto(l5)   r  15
## 99   99         ford               mustang   5.4 2008   8 manual(m6)   r  14
## 100 100        honda                 civic   1.6 1999   4 manual(m5)   f  28
## 101 101        honda                 civic   1.6 1999   4   auto(l4)   f  24
## 102 102        honda                 civic   1.6 1999   4 manual(m5)   f  25
## 103 103        honda                 civic   1.6 1999   4 manual(m5)   f  23
## 104 104        honda                 civic   1.6 1999   4   auto(l4)   f  24
## 105 105        honda                 civic   1.8 2008   4 manual(m5)   f  26
## 106 106        honda                 civic   1.8 2008   4   auto(l5)   f  25
## 107 107        honda                 civic   1.8 2008   4   auto(l5)   f  24
## 108 108        honda                 civic   2.0 2008   4 manual(m6)   f  21
## 109 109      hyundai                sonata   2.4 1999   4   auto(l4)   f  18
## 110 110      hyundai                sonata   2.4 1999   4 manual(m5)   f  18
## 111 111      hyundai                sonata   2.4 2008   4   auto(l4)   f  21
## 112 112      hyundai                sonata   2.4 2008   4 manual(m5)   f  21
## 113 113      hyundai                sonata   2.5 1999   6   auto(l4)   f  18
## 114 114      hyundai                sonata   2.5 1999   6 manual(m5)   f  18
## 115 115      hyundai                sonata   3.3 2008   6   auto(l5)   f  19
## 116 116      hyundai               tiburon   2.0 1999   4   auto(l4)   f  19
## 117 117      hyundai               tiburon   2.0 1999   4 manual(m5)   f  19
## 118 118      hyundai               tiburon   2.0 2008   4 manual(m5)   f  20
## 119 119      hyundai               tiburon   2.0 2008   4   auto(l4)   f  20
## 120 120      hyundai               tiburon   2.7 2008   6   auto(l4)   f  17
## 121 121      hyundai               tiburon   2.7 2008   6 manual(m6)   f  16
## 122 122      hyundai               tiburon   2.7 2008   6 manual(m5)   f  17
## 123 123         jeep     grand cherokee 4wd   3.0 2008   6   auto(l5)   4  17
## 124 124         jeep     grand cherokee 4wd   3.7 2008   6   auto(l5)   4  15
## 125 125         jeep     grand cherokee 4wd   4.0 1999   6   auto(l4)   4  15
## 126 126         jeep     grand cherokee 4wd   4.7 1999   8   auto(l4)   4  14
## 127 127         jeep     grand cherokee 4wd   4.7 2008   8   auto(l5)   4   9
## 128 128         jeep     grand cherokee 4wd   4.7 2008   8   auto(l5)   4  14
## 129 129         jeep     grand cherokee 4wd   5.7 2008   8   auto(l5)   4  13
## 130 130         jeep     grand cherokee 4wd   6.1 2008   8   auto(l5)   4  11
## 131 131   land rover            range rover   4.0 1999   8   auto(l4)   4  11
## 132 132   land rover            range rover   4.2 2008   8   auto(s6)   4  12
## 133 133   land rover            range rover   4.4 2008   8   auto(s6)   4  12
## 134 134   land rover            range rover   4.6 1999   8   auto(l4)   4  11
## 135 135      lincoln          navigator 2wd   5.4 1999   8   auto(l4)   r  11
## 136 136      lincoln          navigator 2wd   5.4 1999   8   auto(l4)   r  11
## 137 137      lincoln          navigator 2wd   5.4 2008   8   auto(l6)   r  12
## 138 138      mercury        mountaineer 4wd   4.0 1999   6   auto(l5)   4  14
## 139 139      mercury        mountaineer 4wd   4.0 2008   6   auto(l5)   4  13
## 140 140      mercury        mountaineer 4wd   4.6 2008   8   auto(l6)   4  13
## 141 141      mercury        mountaineer 4wd   5.0 1999   8   auto(l4)   4  13
## 142 142       nissan                altima   2.4 1999   4 manual(m5)   f  21
## 143 143       nissan                altima   2.4 1999   4   auto(l4)   f  19
## 144 144       nissan                altima   2.5 2008   4   auto(av)   f  23
## 145 145       nissan                altima   2.5 2008   4 manual(m6)   f  23
## 146 146       nissan                altima   3.5 2008   6 manual(m6)   f  19
## 147 147       nissan                altima   3.5 2008   6   auto(av)   f  19
```

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## 148 148       nissan                 maxima   3.0 1999   6   auto(l4)   f  18
## 149 149       nissan                 maxima   3.0 1999   6 manual(m5)   f  19
## 150 150       nissan                 maxima   3.5 2008   6   auto(av)   f  19
## 151 151       nissan          pathfinder 4wd   3.3 1999   6   auto(l4)   4  14
## 152 152       nissan          pathfinder 4wd   3.3 1999   6 manual(m5)   4  15
## 153 153       nissan          pathfinder 4wd   4.0 2008   6   auto(l5)   4  14
## 154 154       nissan          pathfinder 4wd   5.6 2008   8   auto(s5)   4  12
## 155 155      pontiac              grand prix   3.1 1999   6   auto(l4)   f  18
## 156 156      pontiac              grand prix   3.8 1999   6   auto(l4)   f  16
## 157 157      pontiac              grand prix   3.8 1999   6   auto(l4)   f  17
## 158 158      pontiac              grand prix   3.8 2008   6   auto(l4)   f  18
## 159 159      pontiac              grand prix   5.3 2008   8   auto(s4)   f  16
## 160 160       subaru           forester awd   2.5 1999   4 manual(m5)   4  18
## 161 161       subaru           forester awd   2.5 1999   4   auto(l4)   4  18
## 162 162       subaru           forester awd   2.5 2008   4 manual(m5)   4  20
## 163 163       subaru           forester awd   2.5 2008   4 manual(m5)   4  19
## 164 164       subaru           forester awd   2.5 2008   4   auto(l4)   4  20
## 165 165       subaru           forester awd   2.5 2008   4   auto(l4)   4  18
## 166 166       subaru            impreza awd   2.2 1999   4   auto(l4)   4  21
## 167 167       subaru            impreza awd   2.2 1999   4 manual(m5)   4  19
## 168 168       subaru            impreza awd   2.5 1999   4 manual(m5)   4  19
## 169 169       subaru            impreza awd   2.5 1999   4   auto(l4)   4  19
## 170 170       subaru            impreza awd   2.5 2008   4   auto(s4)   4  20
## 171 171       subaru            impreza awd   2.5 2008   4   auto(s4)   4  20
## 172 172       subaru            impreza awd   2.5 2008   4 manual(m5)   4  19
## 173 173       subaru            impreza awd   2.5 2008   4 manual(m5)   4  20
## 174 174       toyota            4runner 4wd   2.7 1999   4 manual(m5)   4  15
## 175 175       toyota            4runner 4wd   2.7 1999   4   auto(l4)   4  16
## 176 176       toyota            4runner 4wd   3.4 1999   6   auto(l4)   4  15
## 177 177       toyota            4runner 4wd   3.4 1999   6 manual(m5)   4  15
## 178 178       toyota            4runner 4wd   4.0 2008   6   auto(l5)   4  16
## 179 179       toyota            4runner 4wd   4.7 2008   8   auto(l5)   4  14
## 180 180       toyota                 camry   2.2 1999   4 manual(m5)   f  21
## 181 181       toyota                 camry   2.2 1999   4   auto(l4)   f  21
## 182 182       toyota                 camry   2.4 2008   4 manual(m5)   f  21
## 183 183       toyota                 camry   2.4 2008   4   auto(l5)   f  21
## 184 184       toyota                 camry   3.0 1999   6   auto(l4)   f  18
## 185 185       toyota                 camry   3.0 1999   6 manual(m5)   f  18
## 186 186       toyota                 camry   3.5 2008   6   auto(s6)   f  19
## 187 187       toyota           camry solara   2.2 1999   4   auto(l4)   f  21
## 188 188       toyota           camry solara   2.2 1999   4 manual(m5)   f  21
## 189 189       toyota           camry solara   2.4 2008   4 manual(m5)   f  21
## 190 190       toyota           camry solara   2.4 2008   4   auto(s5)   f  22
## 191 191       toyota           camry solara   3.0 1999   6   auto(l4)   f  18
## 192 192       toyota           camry solara   3.0 1999   6 manual(m5)   f  18
## 193 193       toyota           camry solara   3.3 2008   6   auto(s5)   f  18
## 194 194       toyota                corolla   1.8 1999   4   auto(l3)   f  24
## 195 195       toyota                corolla   1.8 1999   4   auto(l4)   f  24
## 196 196       toyota                corolla   1.8 1999   4 manual(m5)   f  26
## 197 197       toyota                corolla   1.8 2008   4 manual(m5)   f  28
## 198 198       toyota                corolla   1.8 2008   4   auto(l4)   f  26
## 199 199       toyota land cruiser wagon 4wd   4.7 1999   8   auto(l4)   4  11
## 200 200       toyota land cruiser wagon 4wd   5.7 2008   8   auto(s6)   4  13
## 201 201       toyota      toyota tacoma 4wd   2.7 1999   4 manual(m5)   4  15
```

```
## 202 202       toyota      toyota tacoma 4wd   2.7 1999   4   auto(l4)   4  16
## 203 203       toyota      toyota tacoma 4wd   2.7 2008   4 manual(m5)   4  17
## 204 204       toyota      toyota tacoma 4wd   3.4 1999   6 manual(m5)   4  15
## 205 205       toyota      toyota tacoma 4wd   3.4 1999   6   auto(l4)   4  15
## 206 206       toyota      toyota tacoma 4wd   4.0 2008   6 manual(m6)   4  15
## 207 207       toyota      toyota tacoma 4wd   4.0 2008   6   auto(l5)   4  16
## 208 208   volkswagen                 gti   2.0 1999   4 manual(m5)   f  21
## 209 209   volkswagen                 gti   2.0 1999   4   auto(l4)   f  19
## 210 210   volkswagen                 gti   2.0 2008   4 manual(m6)   f  21
## 211 211   volkswagen                 gti   2.0 2008   4   auto(s6)   f  22
## 212 212   volkswagen                 gti   2.8 1999   6 manual(m5)   f  17
## 213 213   volkswagen               jetta   1.9 1999   4 manual(m5)   f  33
## 214 214   volkswagen               jetta   2.0 1999   4 manual(m5)   f  21
## 215 215   volkswagen               jetta   2.0 1999   4   auto(l4)   f  19
## 216 216   volkswagen               jetta   2.0 2008   4   auto(s6)   f  22
## 217 217   volkswagen               jetta   2.0 2008   4 manual(m6)   f  21
## 218 218   volkswagen               jetta   2.5 2008   5   auto(s6)   f  21
## 219 219   volkswagen               jetta   2.5 2008   5 manual(m5)   f  21
## 220 220   volkswagen               jetta   2.8 1999   6   auto(l4)   f  16
## 221 221   volkswagen               jetta   2.8 1999   6 manual(m5)   f  17
## 222 222   volkswagen            new beetle   1.9 1999   4 manual(m5)   f  35
## 223 223   volkswagen            new beetle   1.9 1999   4   auto(l4)   f  29
## 224 224   volkswagen            new beetle   2.0 1999   4 manual(m5)   f  21
## 225 225   volkswagen            new beetle   2.0 1999   4   auto(l4)   f  19
## 226 226   volkswagen            new beetle   2.5 2008   5 manual(m5)   f  20
## 227 227   volkswagen            new beetle   2.5 2008   5   auto(s6)   f  20
## 228 228   volkswagen                passat   1.8 1999   4 manual(m5)   f  21
## 229 229   volkswagen                passat   1.8 1999   4   auto(l5)   f  18
## 230 230   volkswagen                passat   2.0 2008   4   auto(s6)   f  19
## 231 231   volkswagen                passat   2.0 2008   4 manual(m6)   f  21
## 232 232   volkswagen                passat   2.8 1999   6   auto(l5)   f  16
## 233 233   volkswagen                passat   2.8 1999   6 manual(m5)   f  18
## 234 234   volkswagen                passat   3.6 2008   6   auto(s6)   f  17
##     hwy fl      class
## 1    29  p    compact
## 2    29  p    compact
## 3    31  p    compact
## 4    30  p    compact
## 5    26  p    compact
## 6    26  p    compact
## 7    27  p    compact
## 8    26  p    compact
## 9    25  p    compact
## 10   28  p    compact
## 11   27  p    compact
## 12   25  p    compact
## 13   25  p    compact
## 14   25  p    compact
## 15   25  p    compact
## 16   24  p    midsize
## 17   25  p    midsize
## 18   23  p    midsize
## 19   20  r        suv
## 20   15  e        suv
```

```
## 21   20  r        suv
## 22   17  r        suv
## 23   17  r        suv
## 24   26  p    2seater
## 25   23  p    2seater
## 26   26  p    2seater
## 27   25  p    2seater
## 28   24  p    2seater
## 29   19  r        suv
## 30   14  e        suv
## 31   15  r        suv
## 32   17  d        suv
## 33   27  r    midsize
## 34   30  r    midsize
## 35   26  r    midsize
## 36   29  r    midsize
## 37   26  r    midsize
## 38   24  r    minivan
## 39   24  r    minivan
## 40   22  r    minivan
## 41   22  r    minivan
## 42   24  r    minivan
## 43   24  r    minivan
## 44   17  e    minivan
## 45   22  r    minivan
## 46   21  r    minivan
## 47   23  r    minivan
## 48   23  r    minivan
## 49   19  r     pickup
## 50   18  r     pickup
## 51   17  r     pickup
## 52   17  r     pickup
## 53   19  r     pickup
## 54   19  r     pickup
## 55   12  e     pickup
## 56   17  r     pickup
## 57   15  r     pickup
## 58   17  r        suv
## 59   17  r        suv
## 60   12  e        suv
## 61   17  r        suv
## 62   16  r        suv
## 63   18  r        suv
## 64   15  r        suv
## 65   16  r     pickup
## 66   12  e     pickup
## 67   17  r     pickup
## 68   17  r     pickup
## 69   16  r     pickup
## 70   12  e     pickup
## 71   15  r     pickup
## 72   16  r     pickup
## 73   17  r     pickup
## 74   15  r     pickup
```

```
## 75   17  r        suv
## 76   17  r        suv
## 77   18  r        suv
## 78   17  r        suv
## 79   19  r        suv
## 80   17  r        suv
## 81   19  r        suv
## 82   19  r        suv
## 83   17  r        suv
## 84   17  r     pickup
## 85   17  r     pickup
## 86   16  r     pickup
## 87   16  r     pickup
## 88   17  r     pickup
## 89   15  r     pickup
## 90   17  r     pickup
## 91   26  r subcompact
## 92   25  r subcompact
## 93   26  r subcompact
## 94   24  r subcompact
## 95   21  r subcompact
## 96   22  r subcompact
## 97   23  r subcompact
## 98   22  r subcompact
## 99   20  p subcompact
## 100  33  r subcompact
## 101  32  r subcompact
## 102  32  r subcompact
## 103  29  p subcompact
## 104  32  r subcompact
## 105  34  r subcompact
## 106  36  r subcompact
## 107  36  c subcompact
## 108  29  p subcompact
## 109  26  r    midsize
## 110  27  r    midsize
## 111  30  r    midsize
## 112  31  r    midsize
## 113  26  r    midsize
## 114  26  r    midsize
## 115  28  r    midsize
## 116  26  r subcompact
## 117  29  r subcompact
## 118  28  r subcompact
## 119  27  r subcompact
## 120  24  r subcompact
## 121  24  r subcompact
## 122  24  r subcompact
## 123  22  d        suv
## 124  19  r        suv
## 125  20  r        suv
## 126  17  r        suv
## 127  12  e        suv
## 128  19  r        suv
```

```
## 129  18  r        suv
## 130  14  p        suv
## 131  15  p        suv
## 132  18  r        suv
## 133  18  r        suv
## 134  15  p        suv
## 135  17  r        suv
## 136  16  p        suv
## 137  18  r        suv
## 138  17  r        suv
## 139  19  r        suv
## 140  19  r        suv
## 141  17  r        suv
## 142  29  r    compact
## 143  27  r    compact
## 144  31  r    midsize
## 145  32  r    midsize
## 146  27  p    midsize
## 147  26  p    midsize
## 148  26  r    midsize
## 149  25  r    midsize
## 150  25  p    midsize
## 151  17  r        suv
## 152  17  r        suv
## 153  20  p        suv
## 154  18  p        suv
## 155  26  r    midsize
## 156  26  p    midsize
## 157  27  r    midsize
## 158  28  r    midsize
## 159  25  p    midsize
## 160  25  r        suv
## 161  24  r        suv
## 162  27  r        suv
## 163  25  p        suv
## 164  26  r        suv
## 165  23  p        suv
## 166  26  r subcompact
## 167  26  r subcompact
## 168  26  r subcompact
## 169  26  r subcompact
## 170  25  p    compact
## 171  27  r    compact
## 172  25  p    compact
## 173  27  r    compact
## 174  20  r        suv
## 175  20  r        suv
## 176  19  r        suv
## 177  17  r        suv
## 178  20  r        suv
## 179  17  r        suv
## 180  29  r    midsize
## 181  27  r    midsize
## 182  31  r    midsize
```

```
## 183  31  r    midsize
## 184  26  r    midsize
## 185  26  r    midsize
## 186  28  r    midsize
## 187  27  r    compact
## 188  29  r    compact
## 189  31  r    compact
## 190  31  r    compact
## 191  26  r    compact
## 192  26  r    compact
## 193  27  r    compact
## 194  30  r    compact
## 195  33  r    compact
## 196  35  r    compact
## 197  37  r    compact
## 198  35  r    compact
## 199  15  r        suv
## 200  18  r        suv
## 201  20  r     pickup
## 202  20  r     pickup
## 203  22  r     pickup
## 204  17  r     pickup
## 205  19  r     pickup
## 206  18  r     pickup
## 207  20  r     pickup
## 208  29  r    compact
## 209  26  r    compact
## 210  29  p    compact
## 211  29  p    compact
## 212  24  r    compact
## 213  44  d    compact
## 214  29  r    compact
## 215  26  r    compact
## 216  29  p    compact
## 217  29  p    compact
## 218  29  r    compact
## 219  29  r    compact
## 220  23  r    compact
## 221  24  r    compact
## 222  44  d subcompact
## 223  41  d subcompact
## 224  29  r subcompact
## 225  26  r subcompact
## 226  28  r subcompact
## 227  29  r subcompact
## 228  29  p    midsize
## 229  29  p    midsize
## 230  28  p    midsize
## 231  29  p    midsize
## 232  26  p    midsize
## 233  26  p    midsize
## 234  26  p    midsize
```

1B. Which variables from mpg dataset are categorical?

```
is_cont <- sapply(mpg, is.character)
catVars <- names(mpg)[is_cont]
catVars
```

```
## [1] "manufacturer" "model"        "trans"        "drv"          "fl"
## [6] "class"
```

1C. Which are continuous variables?

```
is_cont <- sapply(mpg, is.numeric)
conVars <- names(mpg)[is_cont]
conVars
```

```
## [1] "X"     "displ" "year"  "cyl"   "cty"   "hwy"
```

2. Which manufacturer has the most models in this data set? Which model has the most variations? Show your answer.

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
MostModels <- summarise(group_by(mpg, manufacturer), numModels = n_distinct(model))
MostModels <- arrange(MostModels, desc(numModels))
MostModels <- head(MostModels, 1)


MostVariations <- summarise(group_by(mpg, model), numVariations = n())
MostVariations <- arrange(MostVariations, desc(numVariations))
MostVariations <- head(MostVariations, 1)


cat("Manufacturer with the most models: ", MostModels$manufacturer, "With ", MostModels$numModels, " mo
```

```
## Manufacturer with the most models:  toyota With  6  models
```

```
cat("Model with the most variations: ", MostVariations$model, " with ", MostVariations$numVariations, "
```

```
## Model with the most variations:  caravan 2wd  with  11  variations
```

2A. Group the manufacturers and find the unique models. Show your codes and result.

```
library(dplyr)

manufacturersModels <- data.frame(Manufacturer = mpg$manufacturer, Model = mpg$model)
manufacturersModels
```

```
##     Manufacturer                Model
## 1           audi                   a4
## 2           audi                   a4
## 3           audi                   a4
```

```
## 4           audi                    a4
## 5           audi                    a4
## 6           audi                    a4
## 7           audi                    a4
## 8           audi             a4 quattro
## 9           audi             a4 quattro
## 10          audi             a4 quattro
## 11          audi             a4 quattro
## 12          audi             a4 quattro
## 13          audi             a4 quattro
## 14          audi             a4 quattro
## 15          audi             a4 quattro
## 16          audi             a6 quattro
## 17          audi             a6 quattro
## 18          audi             a6 quattro
## 19     chevrolet     c1500 suburban 2wd
## 20     chevrolet     c1500 suburban 2wd
## 21     chevrolet     c1500 suburban 2wd
## 22     chevrolet     c1500 suburban 2wd
## 23     chevrolet     c1500 suburban 2wd
## 24     chevrolet               corvette
## 25     chevrolet               corvette
## 26     chevrolet               corvette
## 27     chevrolet               corvette
## 28     chevrolet               corvette
## 29     chevrolet        k1500 tahoe 4wd
## 30     chevrolet        k1500 tahoe 4wd
## 31     chevrolet        k1500 tahoe 4wd
## 32     chevrolet        k1500 tahoe 4wd
## 33     chevrolet                 malibu
## 34     chevrolet                 malibu
## 35     chevrolet                 malibu
## 36     chevrolet                 malibu
## 37     chevrolet                 malibu
## 38         dodge            caravan 2wd
## 39         dodge            caravan 2wd
## 40         dodge            caravan 2wd
## 41         dodge            caravan 2wd
## 42         dodge            caravan 2wd
## 43         dodge            caravan 2wd
## 44         dodge            caravan 2wd
## 45         dodge            caravan 2wd
## 46         dodge            caravan 2wd
## 47         dodge            caravan 2wd
## 48         dodge            caravan 2wd
## 49         dodge      dakota pickup 4wd
## 50         dodge      dakota pickup 4wd
## 51         dodge      dakota pickup 4wd
## 52         dodge      dakota pickup 4wd
## 53         dodge      dakota pickup 4wd
## 54         dodge      dakota pickup 4wd
## 55         dodge      dakota pickup 4wd
## 56         dodge      dakota pickup 4wd
## 57         dodge      dakota pickup 4wd
```

```
## 58         dodge            durango 4wd
## 59         dodge            durango 4wd
## 60         dodge            durango 4wd
## 61         dodge            durango 4wd
## 62         dodge            durango 4wd
## 63         dodge            durango 4wd
## 64         dodge            durango 4wd
## 65         dodge    ram 1500 pickup 4wd
## 66         dodge    ram 1500 pickup 4wd
## 67         dodge    ram 1500 pickup 4wd
## 68         dodge    ram 1500 pickup 4wd
## 69         dodge    ram 1500 pickup 4wd
## 70         dodge    ram 1500 pickup 4wd
## 71         dodge    ram 1500 pickup 4wd
## 72         dodge    ram 1500 pickup 4wd
## 73         dodge    ram 1500 pickup 4wd
## 74         dodge    ram 1500 pickup 4wd
## 75          ford         expedition 2wd
## 76          ford         expedition 2wd
## 77          ford         expedition 2wd
## 78          ford           explorer 4wd
## 79          ford           explorer 4wd
## 80          ford           explorer 4wd
## 81          ford           explorer 4wd
## 82          ford           explorer 4wd
## 83          ford           explorer 4wd
## 84          ford        f150 pickup 4wd
## 85          ford        f150 pickup 4wd
## 86          ford        f150 pickup 4wd
## 87          ford        f150 pickup 4wd
## 88          ford        f150 pickup 4wd
## 89          ford        f150 pickup 4wd
## 90          ford        f150 pickup 4wd
## 91          ford                mustang
## 92          ford                mustang
## 93          ford                mustang
## 94          ford                mustang
## 95          ford                mustang
## 96          ford                mustang
## 97          ford                mustang
## 98          ford                mustang
## 99          ford                mustang
## 100        honda                  civic
## 101        honda                  civic
## 102        honda                  civic
## 103        honda                  civic
## 104        honda                  civic
## 105        honda                  civic
## 106        honda                  civic
## 107        honda                  civic
## 108        honda                  civic
## 109      hyundai                 sonata
## 110      hyundai                 sonata
## 111      hyundai                 sonata
```

```
## 112      hyundai                sonata
## 113      hyundai                sonata
## 114      hyundai                sonata
## 115      hyundai                sonata
## 116      hyundai               tiburon
## 117      hyundai               tiburon
## 118      hyundai               tiburon
## 119      hyundai               tiburon
## 120      hyundai               tiburon
## 121      hyundai               tiburon
## 122      hyundai               tiburon
## 123         jeep     grand cherokee 4wd
## 124         jeep     grand cherokee 4wd
## 125         jeep     grand cherokee 4wd
## 126         jeep     grand cherokee 4wd
## 127         jeep     grand cherokee 4wd
## 128         jeep     grand cherokee 4wd
## 129         jeep     grand cherokee 4wd
## 130         jeep     grand cherokee 4wd
## 131   land rover            range rover
## 132   land rover            range rover
## 133   land rover            range rover
## 134   land rover            range rover
## 135      lincoln          navigator 2wd
## 136      lincoln          navigator 2wd
## 137      lincoln          navigator 2wd
## 138      mercury        mountaineer 4wd
## 139      mercury        mountaineer 4wd
## 140      mercury        mountaineer 4wd
## 141      mercury        mountaineer 4wd
## 142       nissan                altima
## 143       nissan                altima
## 144       nissan                altima
## 145       nissan                altima
## 146       nissan                altima
## 147       nissan                altima
## 148       nissan                maxima
## 149       nissan                maxima
## 150       nissan                maxima
## 151       nissan         pathfinder 4wd
## 152       nissan         pathfinder 4wd
## 153       nissan         pathfinder 4wd
## 154       nissan         pathfinder 4wd
## 155      pontiac             grand prix
## 156      pontiac             grand prix
## 157      pontiac             grand prix
## 158      pontiac             grand prix
## 159      pontiac             grand prix
## 160       subaru           forester awd
## 161       subaru           forester awd
## 162       subaru           forester awd
## 163       subaru           forester awd
## 164       subaru           forester awd
## 165       subaru           forester awd
```

```
## 166       subaru            impreza awd
## 167       subaru            impreza awd
## 168       subaru            impreza awd
## 169       subaru            impreza awd
## 170       subaru            impreza awd
## 171       subaru            impreza awd
## 172       subaru            impreza awd
## 173       subaru            impreza awd
## 174       toyota            4runner 4wd
## 175       toyota            4runner 4wd
## 176       toyota            4runner 4wd
## 177       toyota            4runner 4wd
## 178       toyota            4runner 4wd
## 179       toyota            4runner 4wd
## 180       toyota                  camry
## 181       toyota                  camry
## 182       toyota                  camry
## 183       toyota                  camry
## 184       toyota                  camry
## 185       toyota                  camry
## 186       toyota                  camry
## 187       toyota           camry solara
## 188       toyota           camry solara
## 189       toyota           camry solara
## 190       toyota           camry solara
## 191       toyota           camry solara
## 192       toyota           camry solara
## 193       toyota           camry solara
## 194       toyota                corolla
## 195       toyota                corolla
## 196       toyota                corolla
## 197       toyota                corolla
## 198       toyota                corolla
## 199       toyota land cruiser wagon 4wd
## 200       toyota land cruiser wagon 4wd
## 201       toyota      toyota tacoma 4wd
## 202       toyota      toyota tacoma 4wd
## 203       toyota      toyota tacoma 4wd
## 204       toyota      toyota tacoma 4wd
## 205       toyota      toyota tacoma 4wd
## 206       toyota      toyota tacoma 4wd
## 207       toyota      toyota tacoma 4wd
## 208   volkswagen                  gti
## 209   volkswagen                  gti
## 210   volkswagen                  gti
## 211   volkswagen                  gti
## 212   volkswagen                  gti
## 213   volkswagen                jetta
## 214   volkswagen                jetta
## 215   volkswagen                jetta
## 216   volkswagen                jetta
## 217   volkswagen                jetta
## 218   volkswagen                jetta
## 219   volkswagen                jetta
```

```
## 220   volkswagen                 jetta
## 221   volkswagen                 jetta
## 222   volkswagen             new beetle
## 223   volkswagen             new beetle
## 224   volkswagen             new beetle
## 225   volkswagen             new beetle
## 226   volkswagen             new beetle
## 227   volkswagen             new beetle
## 228   volkswagen                 passat
## 229   volkswagen                 passat
## 230   volkswagen                 passat
## 231   volkswagen                 passat
## 232   volkswagen                 passat
## 233   volkswagen                 passat
## 234   volkswagen                 passat
```

```
uniqueMods <- unique(manufacturersModels)
uniqueMods
```

```
##     Manufacturer                  Model
## 1           audi                     a4
## 8           audi             a4 quattro
## 16          audi             a6 quattro
## 19     chevrolet     c1500 suburban 2wd
## 24     chevrolet              corvette
## 29     chevrolet        k1500 tahoe 4wd
## 33     chevrolet                malibu
## 38         dodge            caravan 2wd
## 49         dodge      dakota pickup 4wd
## 58         dodge            durango 4wd
## 65         dodge    ram 1500 pickup 4wd
## 75          ford         expedition 2wd
## 78          ford           explorer 4wd
## 84          ford        f150 pickup 4wd
## 91          ford                mustang
## 100        honda                  civic
## 109      hyundai                sonata
## 116      hyundai               tiburon
## 123         jeep     grand cherokee 4wd
## 131   land rover            range rover
## 135      lincoln          navigator 2wd
## 138      mercury        mountaineer 4wd
## 142       nissan                altima
## 148       nissan                maxima
## 151       nissan         pathfinder 4wd
## 155      pontiac             grand prix
## 160       subaru           forester awd
## 166       subaru            impreza awd
## 174       toyota            4runner 4wd
## 180       toyota                 camry
## 187       toyota           camry solara
## 194       toyota                corolla
## 199       toyota land cruiser wagon 4wd
## 201       toyota      toyota tacoma 4wd
## 208   volkswagen                   gti
```

```
## 213   volkswagen                  jetta
## 222   volkswagen             new beetle
## 228   volkswagen                 passat
```

```
uniqueModsFactor <- factoredManufacturer <- as.factor(uniqueMods$Manufacturer)
```

2B Graph the result by using plot() and ggplot(). Write the codes and its result.

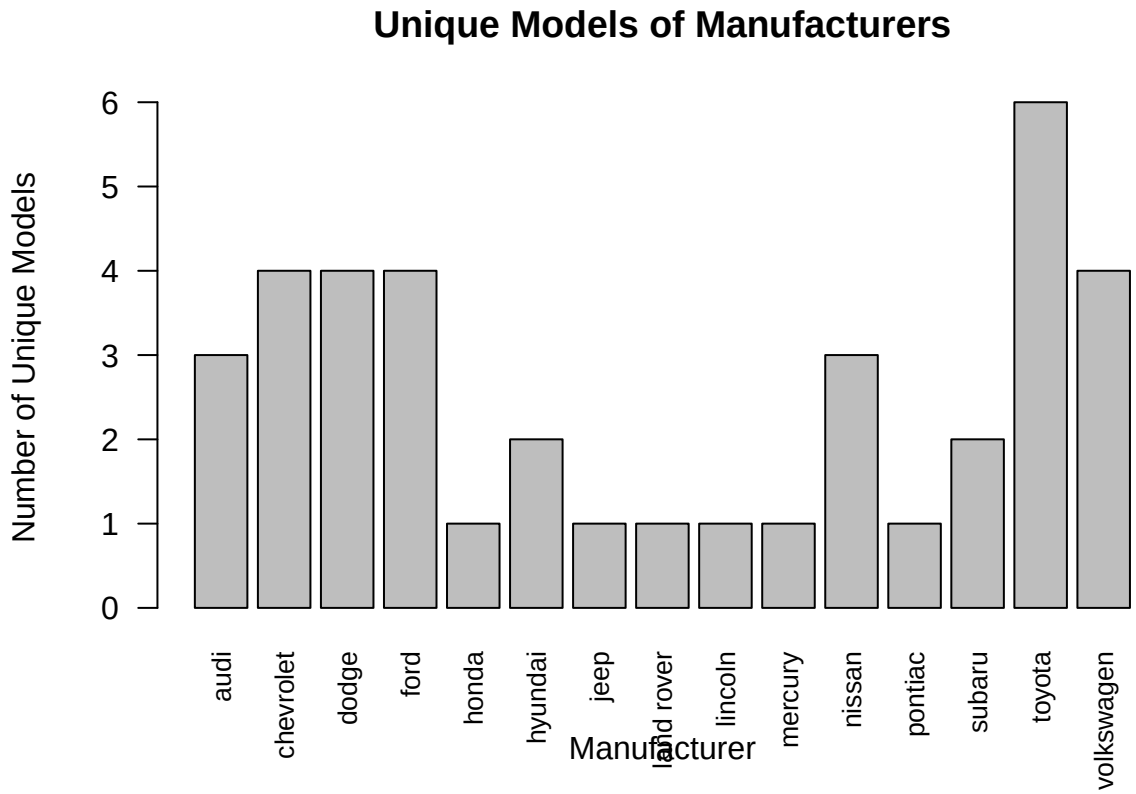
```
library(ggplot2)
```

```
##
## Attaching package: 'ggplot2'
```

```
## The following object is masked _by_ '.GlobalEnv':
##
##     mpg
```

```
library(dplyr)

uniquePlot <- plot(as.factor(factoredManufacturer),
                main = "Unique Models of Manufacturers",
                xlab = "Manufacturer",
                ylab = "Number of Unique Models",
                cex.names = 0.8, las = 2)
```

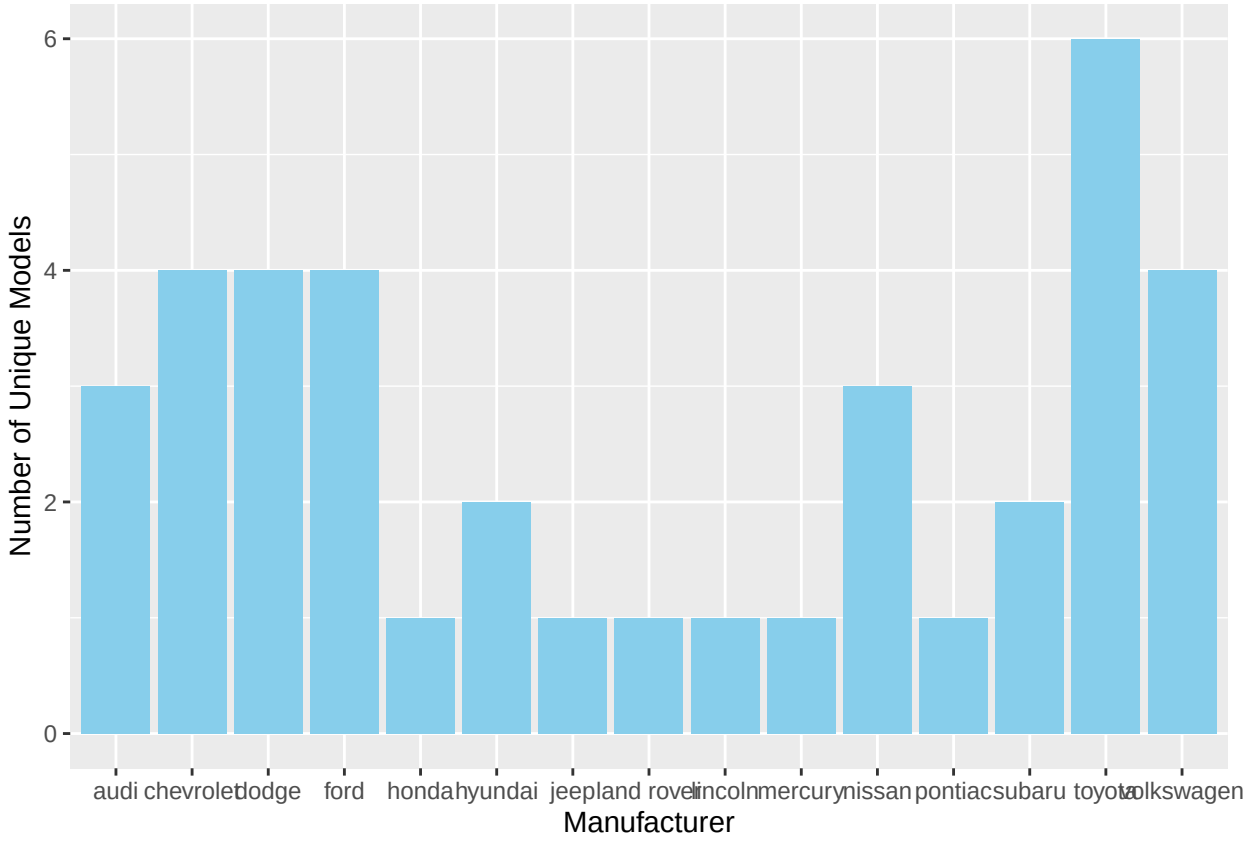



```
uniqueCount <- uniqueMods %>%
  count(uniqueMods$Manufacturer)
uniqueCount
```

```
##    uniqueMods$Manufacturer n
## 1                     audi 3
## 2                chevrolet 4
```

```
## 3                    dodge 4
## 4                     ford 4
## 5                    honda 1
## 6                  hyundai 2
## 7                     jeep 1
## 8                land rover 1
## 9                   lincoln 1
## 10                  mercury 1
## 11                   nissan 3
## 12                  pontiac 1
## 13                   subaru 2
## 14                   toyota 6
## 15               volkswagen 4
```

```
ggplot(uniqueCount, aes(x = `uniqueMods$Manufacturer`, y = n)) +
geom_bar(stat = "identity", fill = "skyblue") +
  labs(x = "Manufacturer", y = "Number of Unique Models")
```

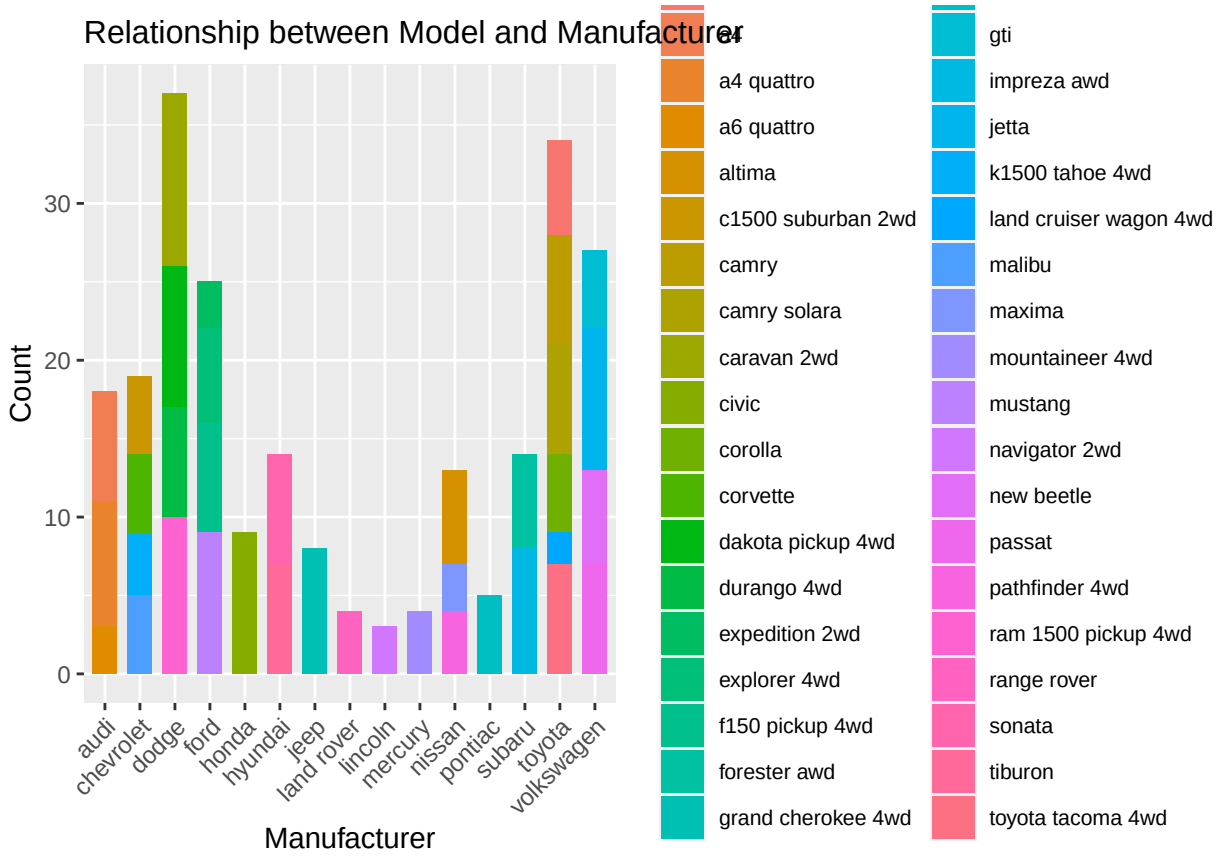


2.1 Same dataset will be used. You are going to show the relationship of the model and the manufacturer.

```
# Load necessary library
library(ggplot2)

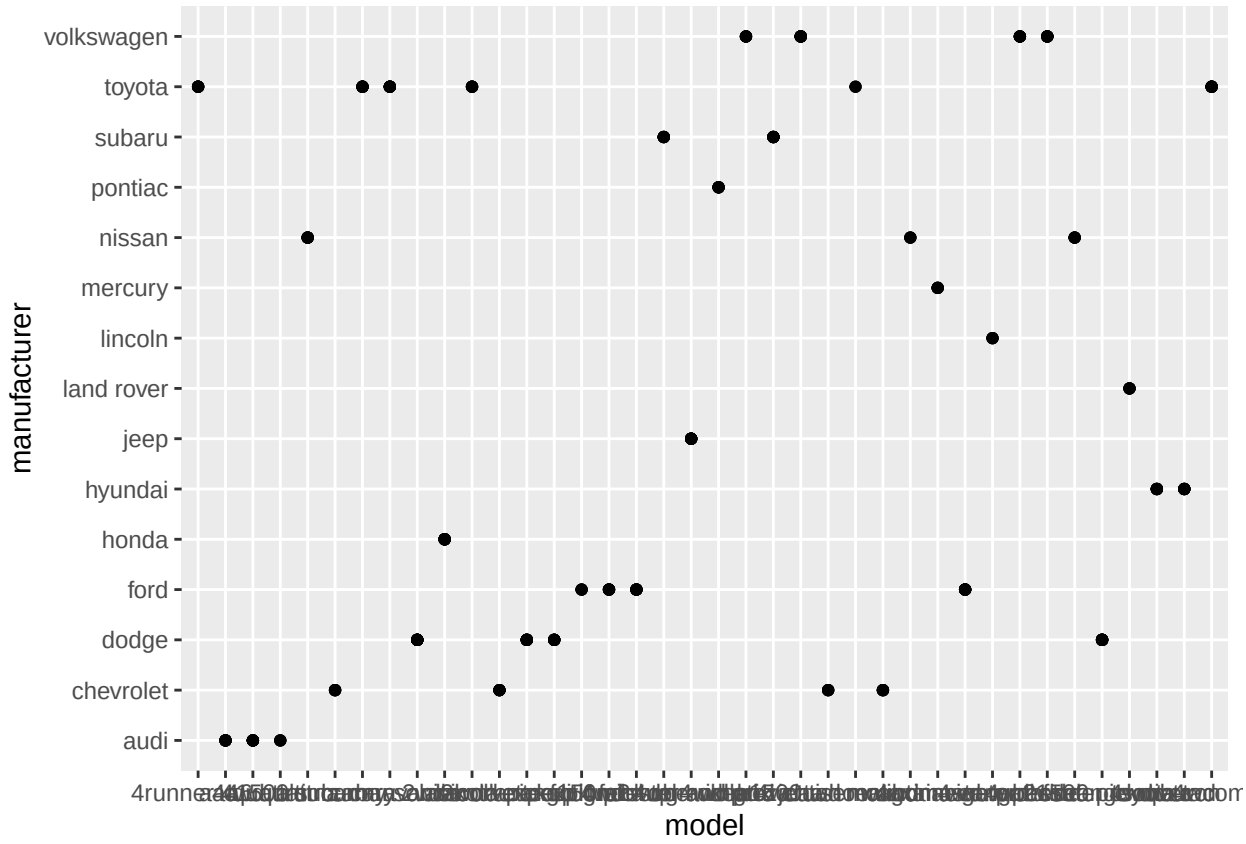
# Create a smaller bar plot
ggplot(mpg, aes(x = manufacturer, fill = model)) +
  geom_bar(width = 0.7) +
  labs(title = "Relationship between Model and Manufacturer",
       x = "Manufacturer",
```

```
      y = "Count",
      fill = "Model") +
 theme(axis.text.x = element_text(angle = 45, hjust = 1),
       plot.title = element_text(size = 12),
       legend.title = element_text(size = 10),
       legend.text = element_text(size = 8))
```



2.1A What does ggplot(mpg, aes(model, manufacturer)) + geom_point() show?

```
ggplot(mpg, aes(model, manufacturer)) + geom_point()
```

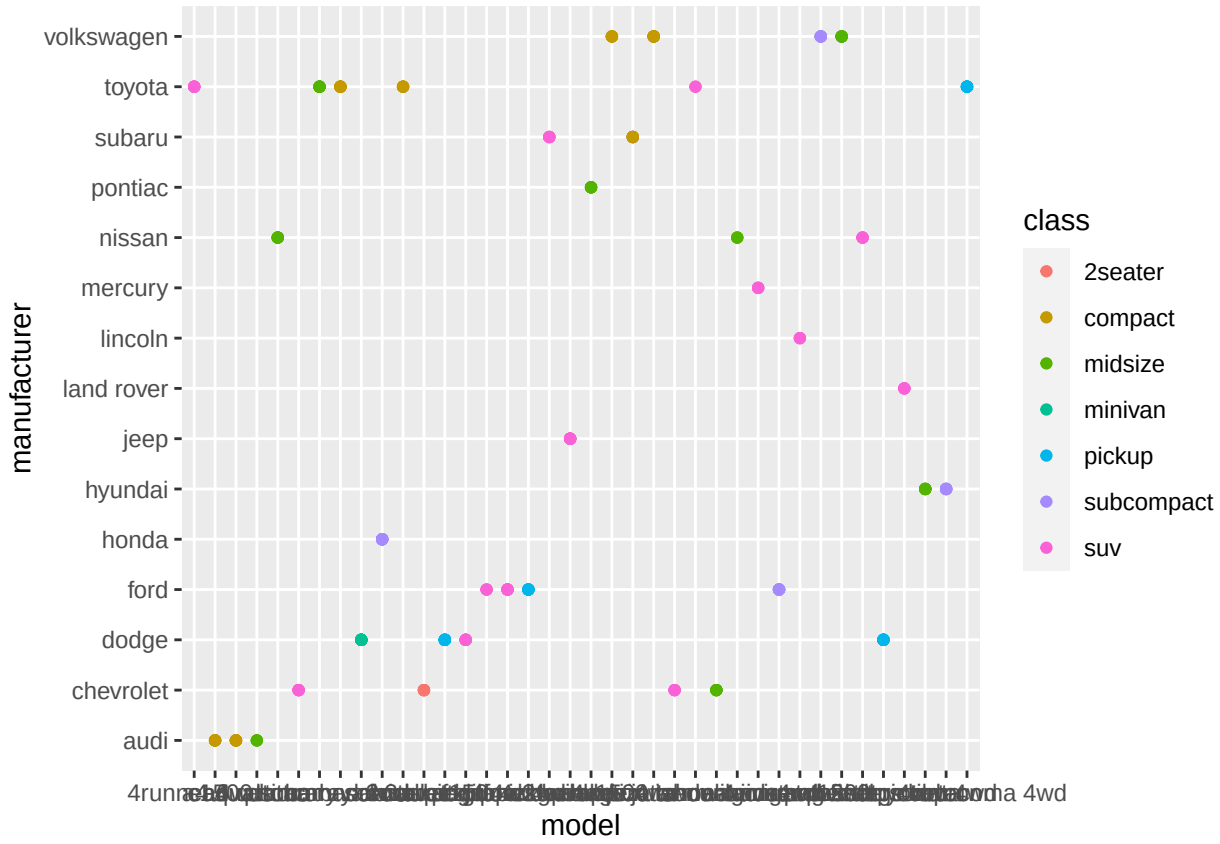



```
#The horizontal axis (x-axis) represents the "model" variable, indicating different car models. The ver

#The geom_point() function is employed to place points on the plot, representing each combination of tw
```

2.1B For you, is it useful? If not, how could you modify the data to make it more informative?

```
ggplot(mpg, aes(x = model, y = manufacturer, color = class)) + geom_point()
```



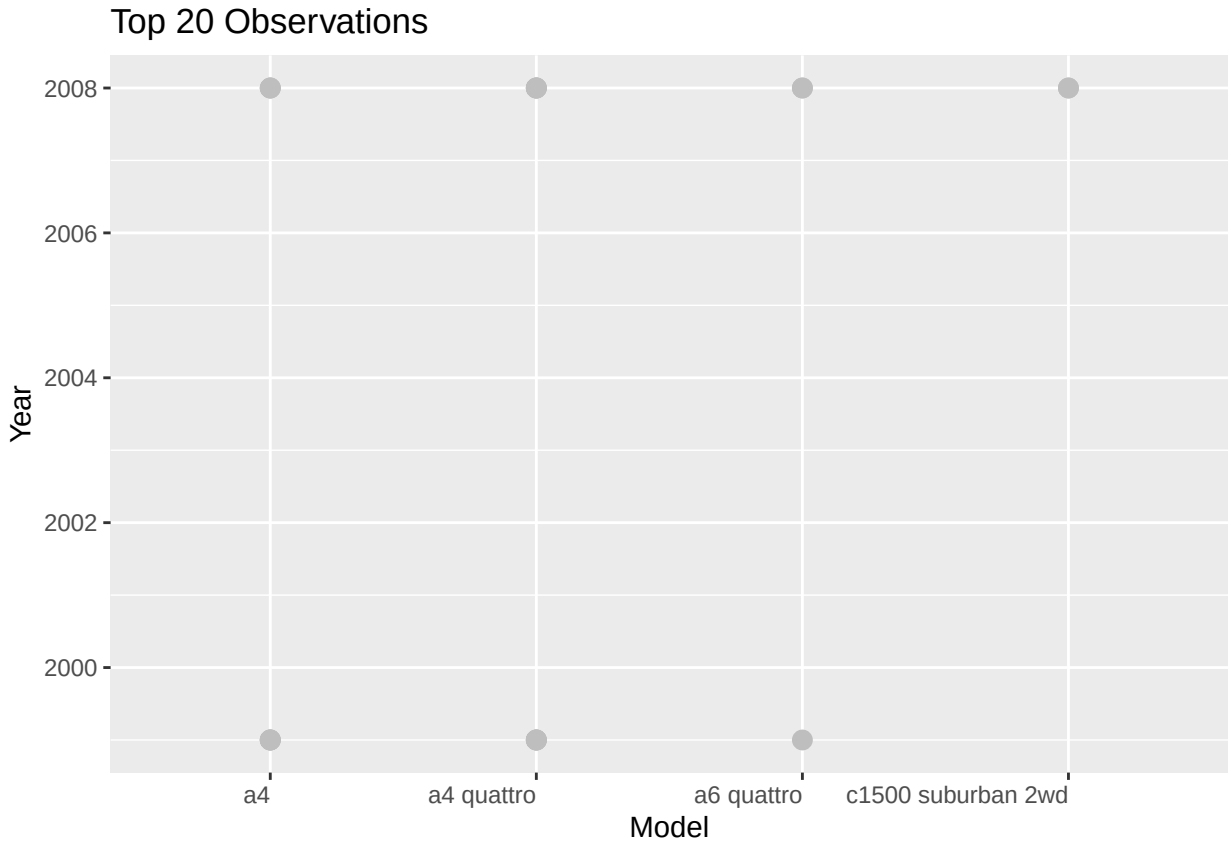

```
#To make the plot more informative, I used different colors or shapes for points to represent additiona
```

3. Plot the model and the year using ggplot(). Use only the top 20 observations. Write the codes and its results

```
library(ggplot2)


top20 <- head(mpg, 20)


ggplot(top20, aes(x = model, y = year)) +
  geom_point(size = 3, color = "gray") +
  labs(title = "Top 20 Observations",
       x = "Model",
       y = "Year") +
  theme(axis.text.x = element_text(angle = 0, hjust = 1))
```



4.Using the pipe (%>%), group the model and get the number of cars per model. Show codes and its result

```
library(dplyr)

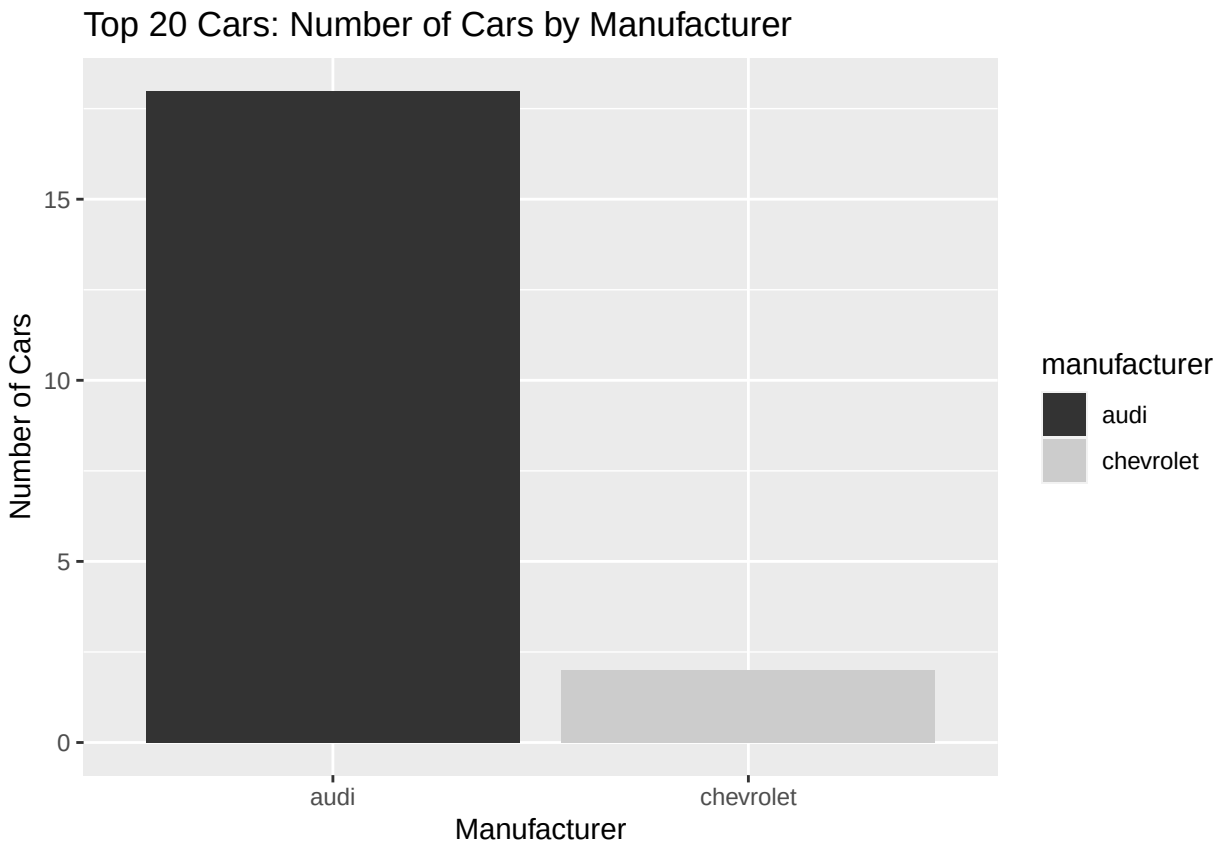

mpg %>%
  group_by(model) %>%
  summarise(numCars = n())
```

```
## # A tibble: 38 x 2
##    model              numCars
##    <chr>                <int>
##  1 4runner 4wd              6
##  2 a4                       7
##  3 a4 quattro               8
##  4 a6 quattro               3
##  5 altima                   6
##  6 c1500 suburban 2wd       5
##  7 camry                    7
##  8 camry solara             7
##  9 caravan 2wd             11
## 10 civic                    9
## # i 28 more rows
```

4A. Plot using geom_bar() using the top 20 observations only. The graphs should have a title, labels and colors. Show code and results.

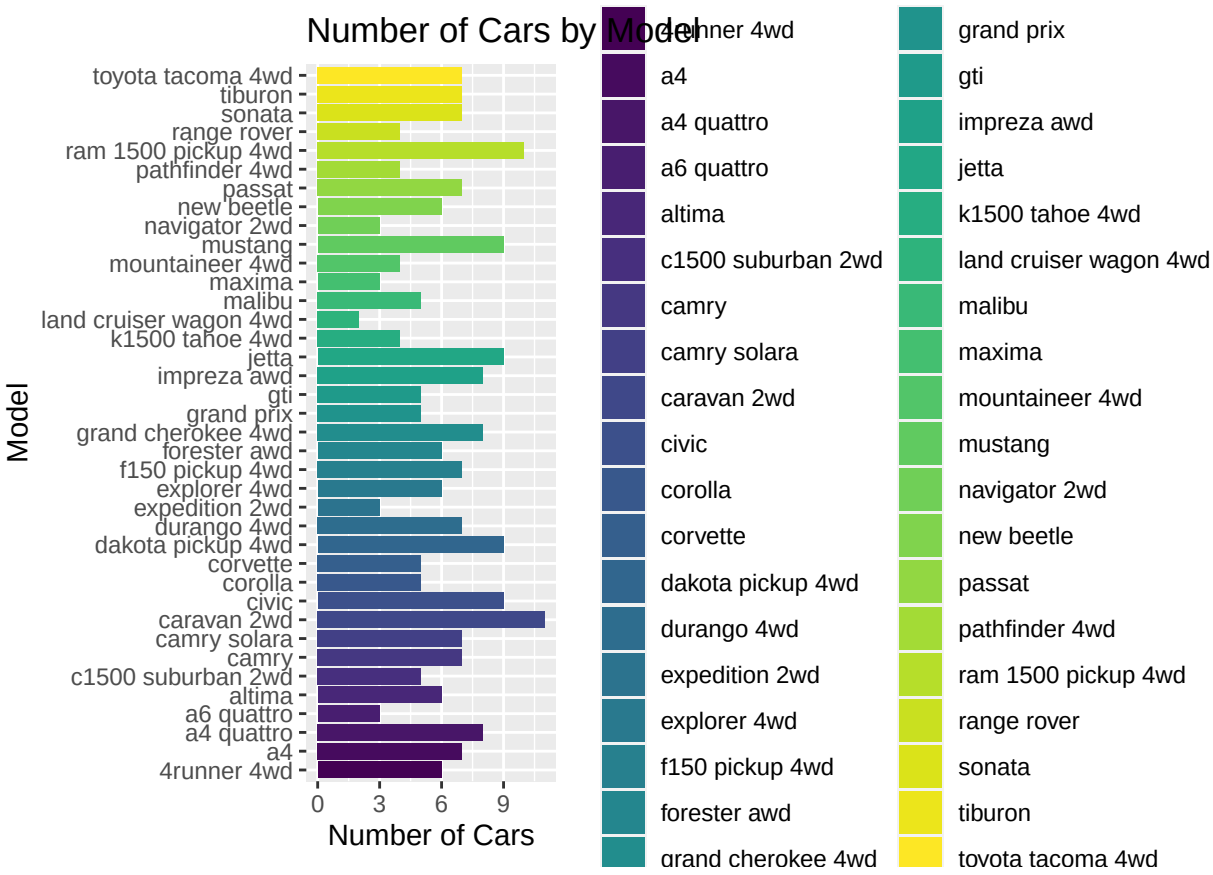
```
library(ggplot2)
```

```r
top20 <- head(mpg, 20)

ggplot(top20, aes(x = manufacturer, fill = manufacturer)) +
  geom_bar() +
  labs(title = "Top 20 Cars: Number of Cars by Manufacturer",
       x = "Manufacturer",
       y = "Number of Cars") +
  scale_fill_grey()
```



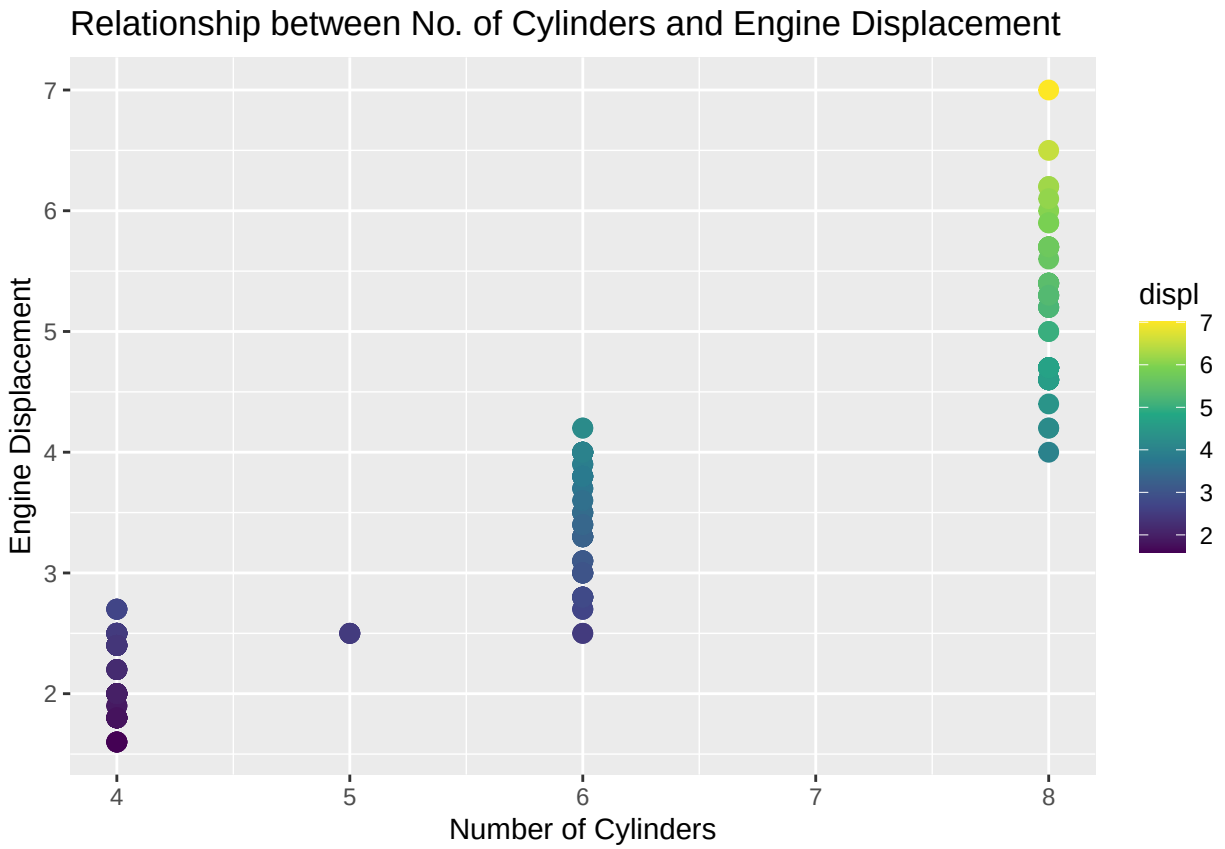
4B. Plot using the geom_bar() + coord_flip() just like what is shown below. Show codes and its result.

```r
library(ggplot2)

ggplot(mpg, aes(x = model, fill = model)) +
  geom_bar() +
  coord_flip() +
  labs(title = "Number of Cars by Model",
       x = "Model",
       y = "Number of Cars") +
  scale_fill_viridis_d()
```



5. Plot the relationship between cyl - number of cylinders and displ - engine displacement using geom_point with aesthetic color = engine displacement. Title should be "Relationship between No. of Cylinders and Engine Displacement"

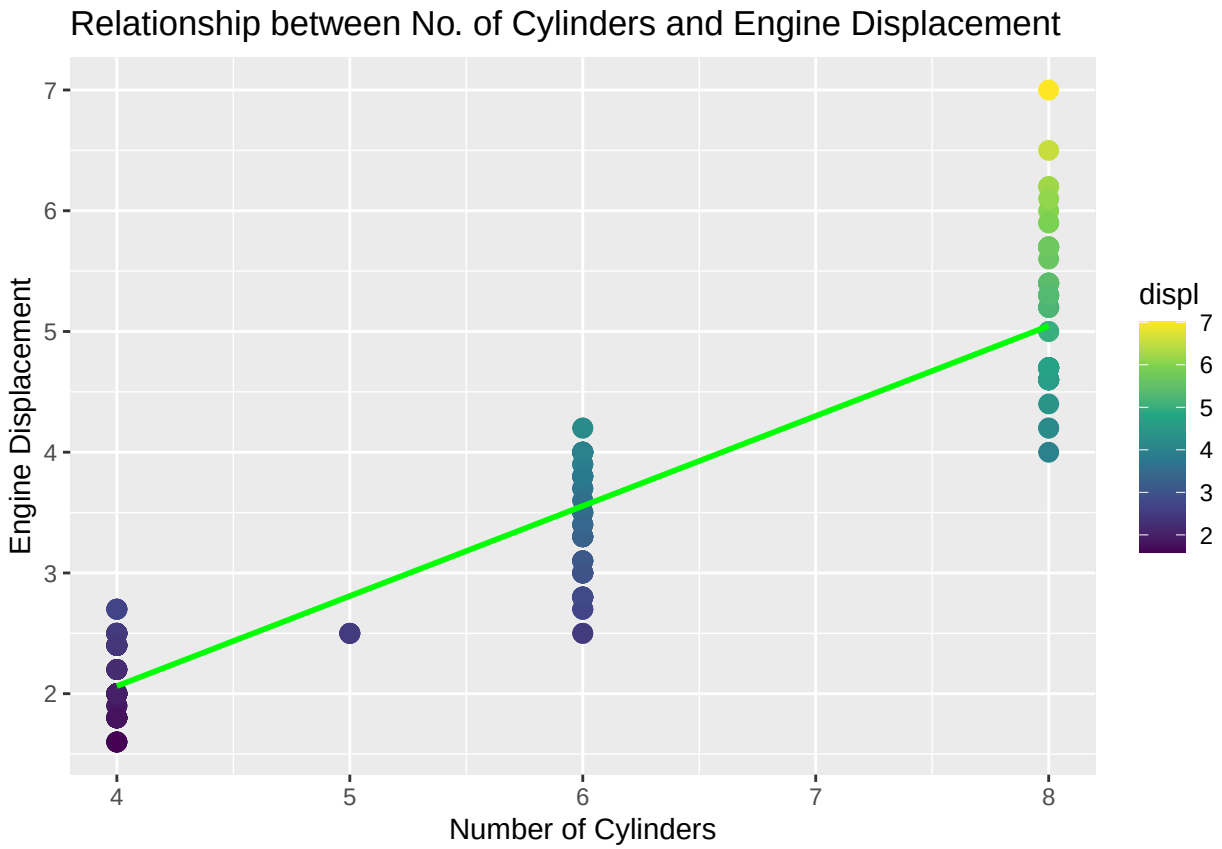
```
library(ggplot2)

ggplot(mpg, aes(x = cyl, y = displ, color = displ)) +
  geom_point(size = 3) +
  labs(title = "Relationship between No. of Cylinders and Engine Displacement",
       x = "Number of Cylinders",
       y = "Engine Displacement") +
  scale_color_viridis_c()
```



5A. How would you describe its relationship? Show the codes and its result.

```
library(ggplot2)

ggplot(mpg, aes(x = cyl, y = displ, color = displ)) +
  geom_point(size = 3) +
  geom_smooth(method = "lm", se = FALSE, linetype = "solid", color = "green") +
  labs(title = "Relationship between No. of Cylinders and Engine Displacement",
       x = "Number of Cylinders",
       y = "Engine Displacement") +
  scale_color_viridis_c()
```

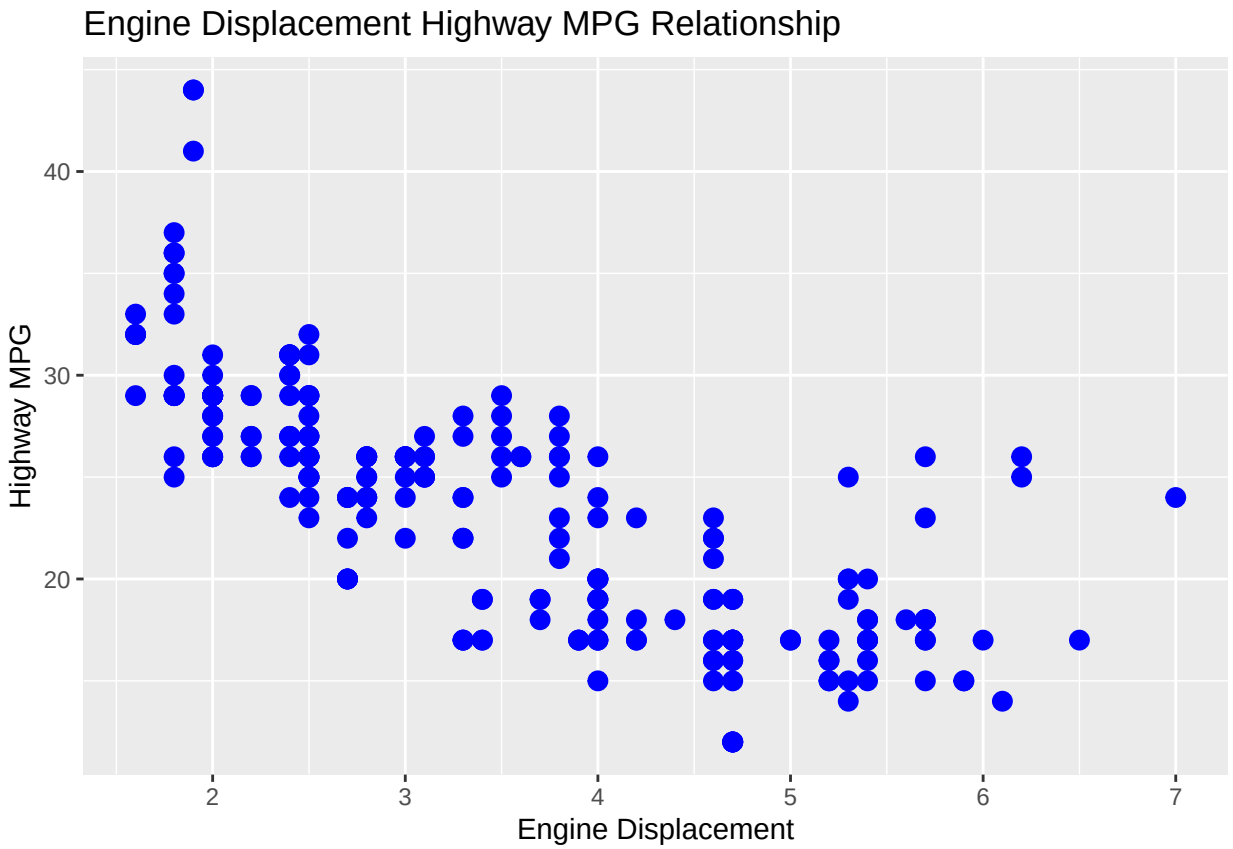
```
## `geom_smooth()` using formula = 'y ~ x'
```




```
#The interpretation of the relationship relies on the visual characteristics of the scatter plot and th
```

6. Plot the relationship between displ (engine displacement) and hwy(highway miles per gallon). Mapped it with a continuous variable you have identified in #1-c. What is its result? Why it produced such output?

```
library(ggplot2)

ggplot(mpg, aes(x = displ, y = hwy, color = cyl)) +
  geom_point(size = 3, color = "blue") +
  labs(title = "Engine Displacement Highway MPG Relationship ",
       x = "Engine Displacement",
       y = "Highway MPG")
```



6. Import the traffic.csv onto your R environment

```
library(readr)
traffic <- read.csv("traffic.csv")
```

6A. How many numbers of observation does it have? What are the variables of the traffic dataset the Show your answer.

```
Observation <- nrow(traffic)
cat("Number of Observations:", Observation, "\n")
```

```
## Number of Observations: 48120
```

```
numVars <- ncol(traffic)
cat("Number of Variables:", numVars, "\n")
```

```
## Number of Variables: 4
```

```
vars <- colnames(traffic)
cat("Variable Names:", paste(vars, collapse = ", "), "\n")
```

```
## Variable Names: DateTime, Junction, Vehicles, ID
```

6B. Subset the traffic dataset into junctions. What is the R codes and its output?

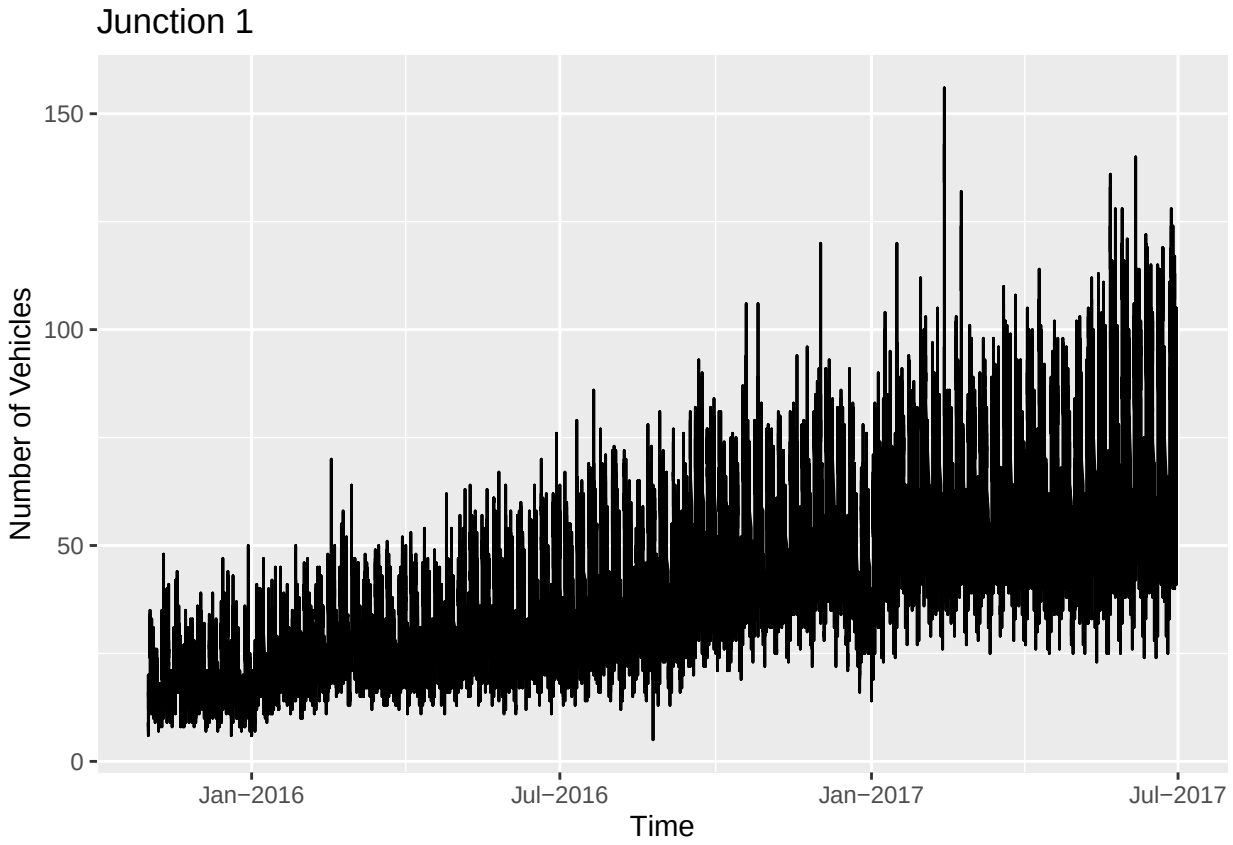
```
Subset1 <- subset(traffic, Junction == 1)

Subset2 <- subset(traffic, Junction == 2)

Subset3 <- subset(traffic, Junction == 3)
```

```
Subset4 <- subset(traffic, Junction == 4)
```

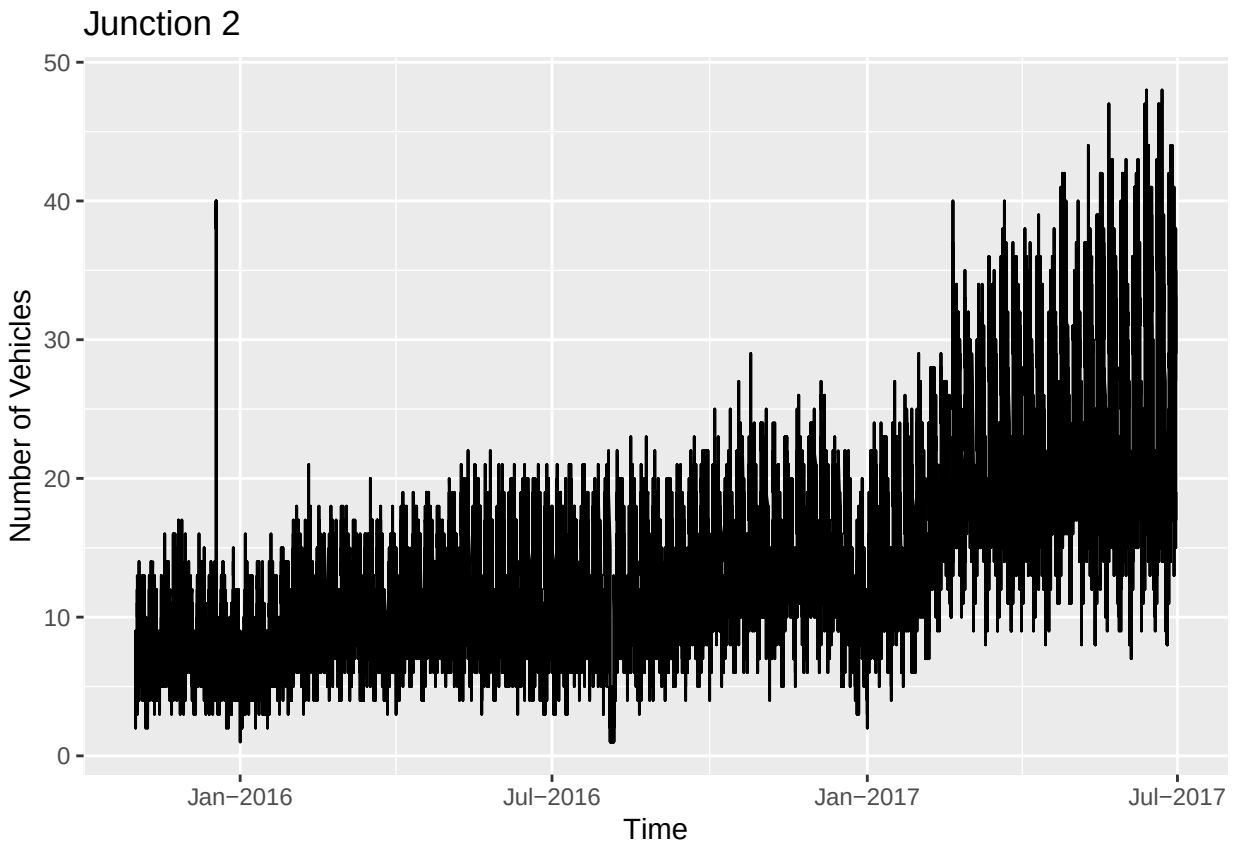
6C. Plot each junction in a using geom_line(). Show your solution and output

```
junction1Plot <- ggplot(Subset1, aes(x = as.Date(Subset1$DateTime), y = Vehicles)) + geom_line() + scal

junction1Plot
```

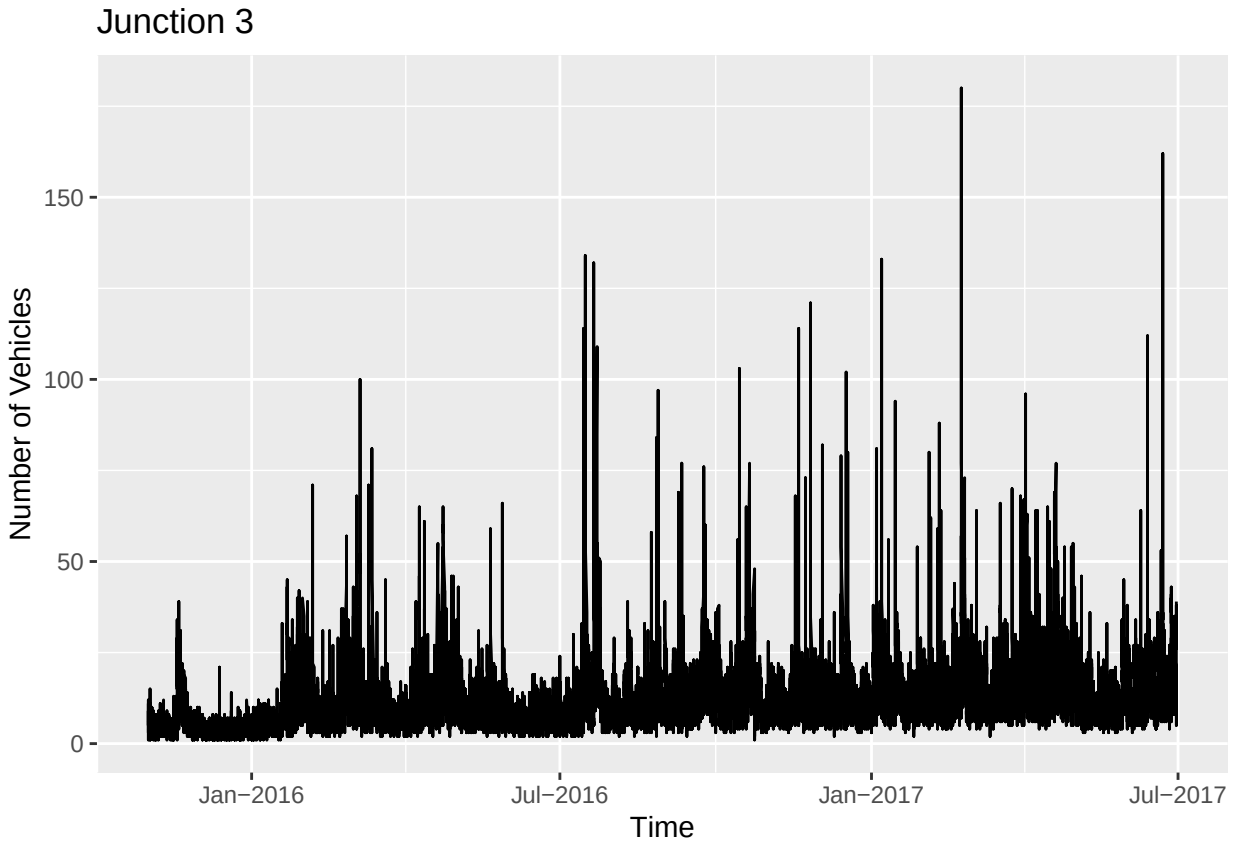
```
## Warning: Use of `Subset1$DateTime` is discouraged.
## i Use `DateTime` instead.
```



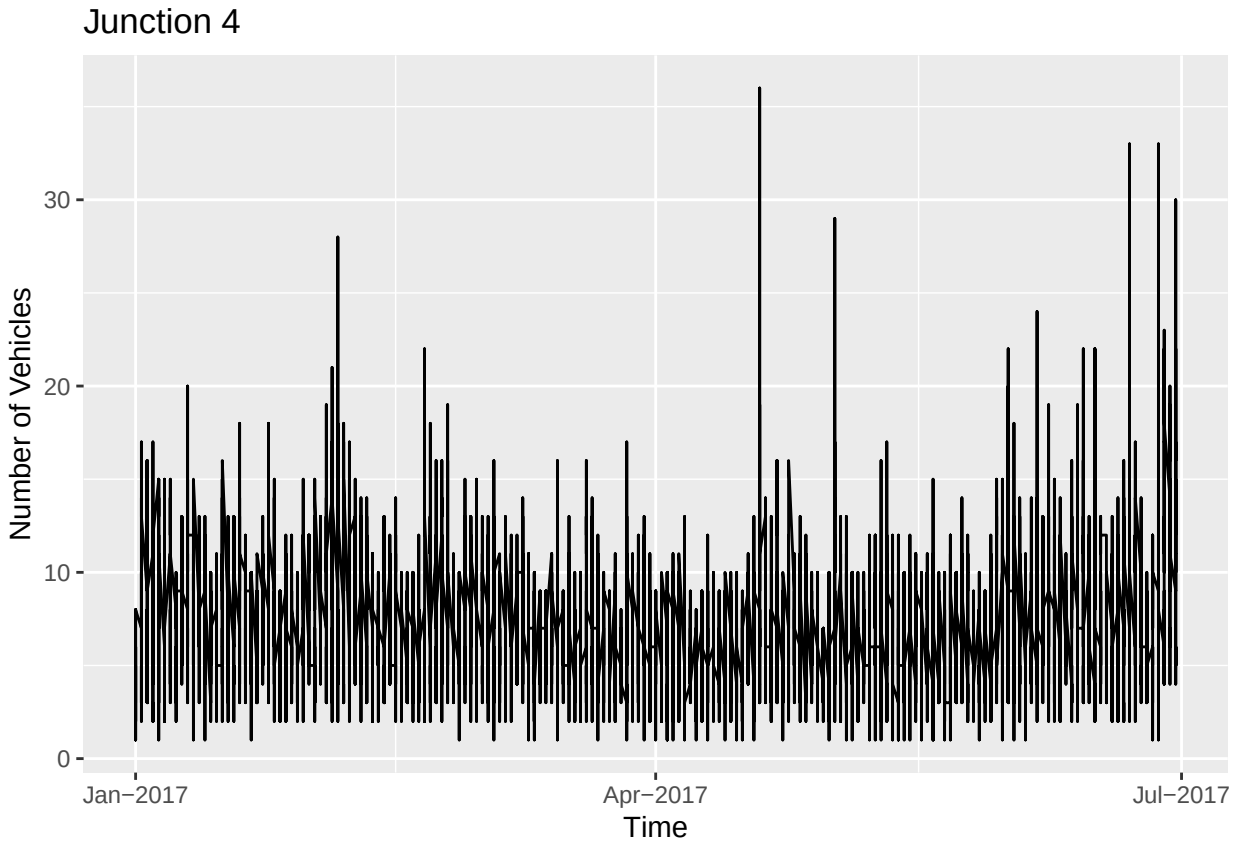

```
junction2Plot <- ggplot(Subset2, aes(x = as.Date(Subset2$DateTime), y = Vehicles)) + geom_line() +
scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") + labs(title = "Junction 2", x =

junction2Plot
```




```
junction3Plot <- ggplot(Subset3, aes(x = as.Date(Subset3$DateTime), y = Vehicles)) + geom_line() +
scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
labs(title = "Junction 3", x = "Time", y = "Number of Vehicles")

junction3Plot
```




```
junction4Plot <- ggplot(Subset4, aes(x = as.Date(Subset4$DateTime), y = Vehicles)) + geom_line() +
scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
labs(title = "Junction 4", x = "Time", y = "Number of Vehicles")

junction4Plot
```



7. From alexa_file.xlsx, import it to your environment

```
library(readxl)

alexaData <- read_excel("/cloud/project/RWorksheet#4/Worksheet4c/alexa_file.xlsx")
```

7A. How many observations does alexa_file has? What about the number of columns? Show your solution and answer.

```
Observation <- nrow(alexaData)
cat("Number of Observations:", Observation, "\n")
```

```
## Number of Observations: 3150
```

```
numCols <- ncol(alexaData)
cat("Number of Columns:", numCols, "\n")
```

```
## Number of Columns: 5
```

7B. Group the variations and get the total of each variations. Use dplyr package. Show solution and answer.

```
library(dplyr)

varTotal <- alexaData %>%
  count(variation)

varTotal
```

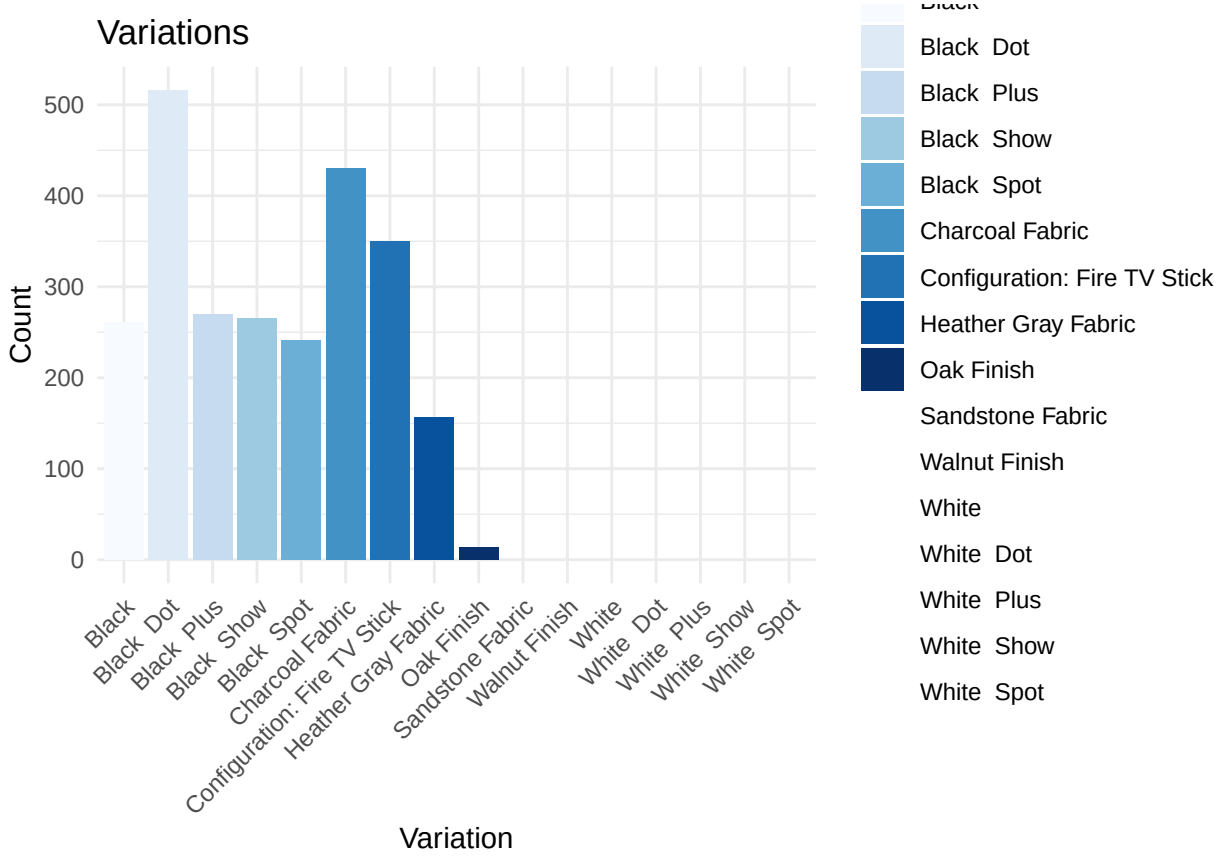
```
## # A tibble: 16 x 2
##    variation                         n
##    <chr>                         <int>
```

```
##  1 Black                          261
##  2 Black  Dot                     516
##  3 Black  Plus                    270
##  4 Black  Show                    265
##  5 Black  Spot                    241
##  6 Charcoal Fabric                430
##  7 Configuration: Fire TV Stick   350
##  8 Heather Gray Fabric            157
##  9 Oak Finish                      14
## 10 Sandstone Fabric                90
## 11 Walnut Finish                    9
## 12 White                           91
## 13 White  Dot                     184
## 14 White  Plus                     78
## 15 White  Show                     85
## 16 White  Spot                    109
```

7C. Plot the variations using the ggplot() function. What did you observe? Complete the details of the graph. Show solution and answer.

```
library(ggplot2)


ggplot(alexaData, aes(x = variation, fill = variation)) +
  geom_bar() +
  labs(title = "Variations", x = "Variation", y = "Count") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
  scale_fill_brewer(palette = "Blues")
```

```
## Warning in RColorBrewer::brewer.pal(n, pal): n too large, allowed maximum for palette Blues is 9
## Returning the palette you asked for with that many colors
```



7D. Plot a geom_line() with the date and the number of verified reviews. Complete the details of the graphs. Show your answer and solution.

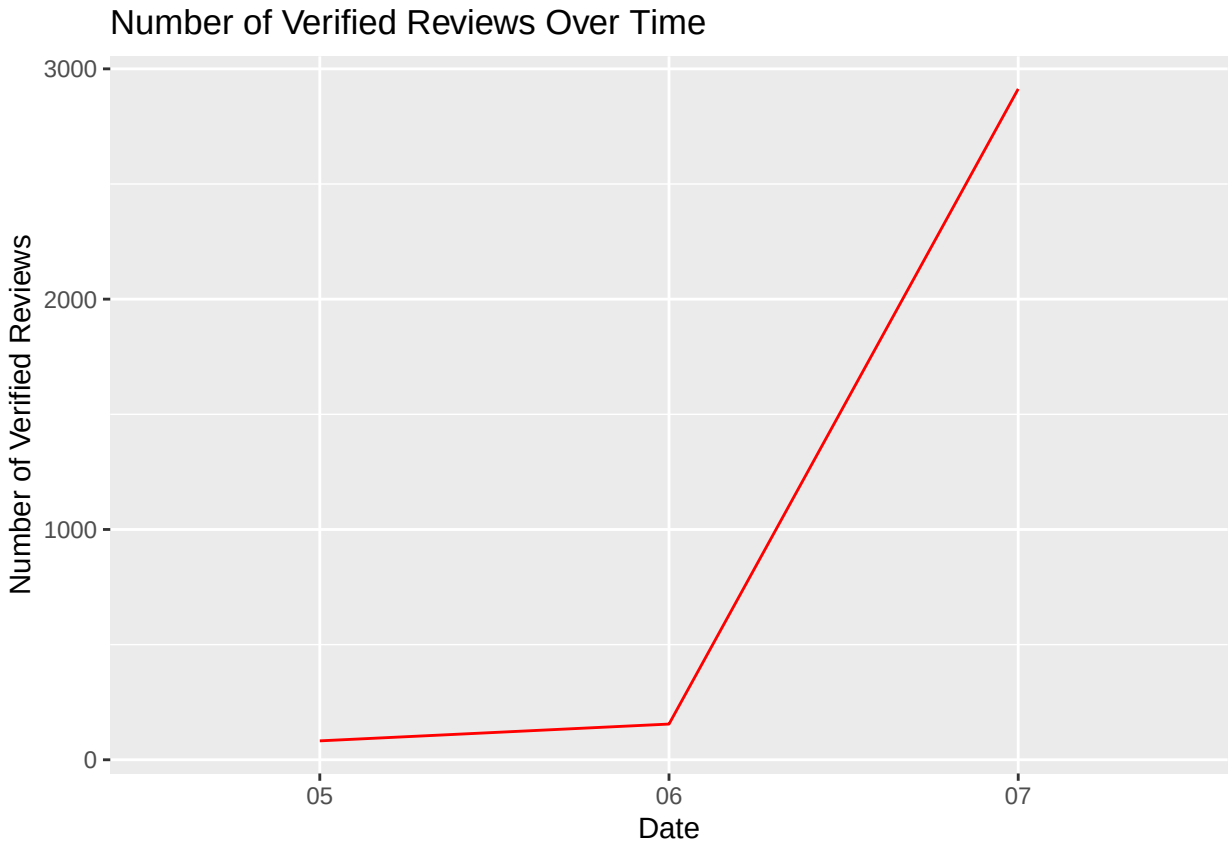
```
library(dplyr)

alexaData$date <- as.Date(alexaData$date)

alexaData$month <- format(alexaData$date, "%m")

countMonth <- alexaData %>%
  count(month)
countMonth
```

```
## # A tibble: 3 x 2
##   month     n
##   <chr> <int>
## 1 05       82
## 2 06      155
## 3 07     2913
```

```
monthlyRevCount <- table(countMonth)
monthlyRevCount
```

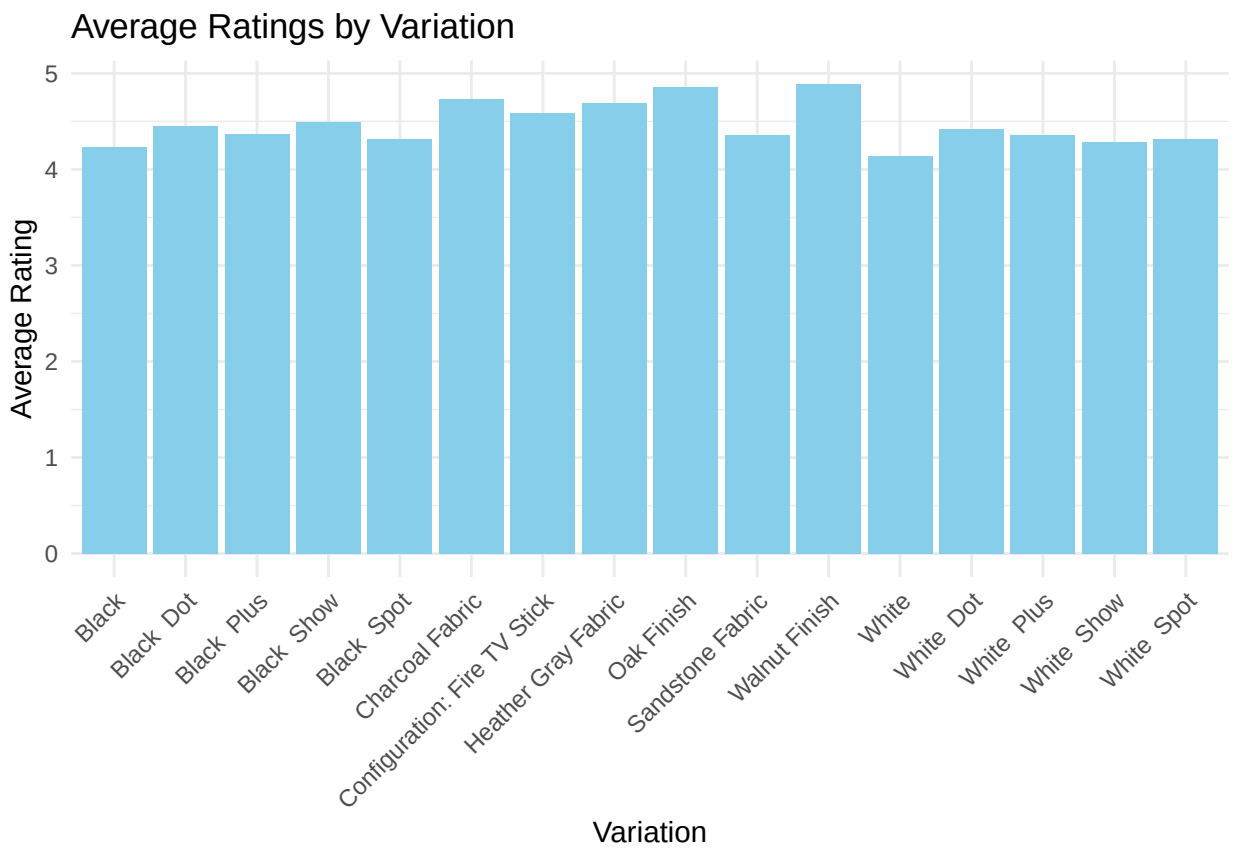
```
##       n
## month 82 155 2913
##    05  1   0    0
##    06  0   1    0
##    07  0   0    1
```

```
alexaLine <- ggplot(countMonth, aes(x = month, y = n, group = 1)) +
  geom_line(color = "red") +
  labs(title = "Number of Verified Reviews Over Time",
       x = "Date",
       y = "Number of Verified Reviews")

alexaLine
```



7E. Get the relationship of variations and ratings. Which variations got the most highest in rating? Plot a graph to show its relationship. Show your solution and answer

```
library(ggplot2)


variationRatings <- alexaData %>%
  group_by(variation) %>%
  summarise(avgRating = mean(rating))


highestRatings <- variationRatings %>%
  filter(avgRating == max(avgRating))


ggplot(variationRatings, aes(x = variation, y = avgRating)) +
  geom_bar(stat = "identity", fill = "skyblue") +
  labs(title = "Average Ratings by Variation", x = "Variation", y = "Average Rating") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```


Average Ratings by Variation
Average Rating
5
4
3
2
1
0
Black
Black Dot
Black Plus
Black Show
Black Spot
Charcoal Fabric
Configuration: Fire TV Stick
Heather Gray Fabric
Oak Finish
Sandstone Fabric
Walnut Finish
White
White Dot
White Plus
White Show
White Spot
Variation