RWorksheet_Canonicato#4c

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#1. Use the dataset mpg

```r
#a. Show your solutions on how to import a csv file into the environment.
library(readr)
mpg <- read.csv("mpg.csv")
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
```

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## 36 36      chevrolet                malibu 3.5 2008 6   auto(14) f 18
## 37 37      chevrolet                malibu 3.6 2008 6   auto(s6) f 17
## 38 38          dodge           caravan 2wd 2.4 1999 4   auto(13) f 18
## 39 39          dodge           caravan 2wd 3.0 1999 6   auto(14) f 17
## 40 40          dodge           caravan 2wd 3.3 1999 6   auto(14) f 16
## 41 41          dodge           caravan 2wd 3.3 1999 6   auto(14) f 16
## 42 42          dodge           caravan 2wd 3.3 2008 6   auto(14) f 17
## 43 43          dodge           caravan 2wd 3.3 2008 6   auto(14) f 17
## 44 44          dodge           caravan 2wd 3.3 2008 6   auto(14) f 11
## 45 45          dodge           caravan 2wd 3.8 1999 6   auto(14) f 15
## 46 46          dodge           caravan 2wd 3.8 1999 6   auto(14) f 15
## 47 47          dodge           caravan 2wd 3.8 2008 6   auto(16) f 16
## 48 48          dodge           caravan 2wd 4.0 2008 6   auto(16) 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(14) 4 14
## 51 51          dodge     dakota pickup 4wd 3.9 1999 6   auto(14) 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(15) 4 14
## 54 54          dodge     dakota pickup 4wd 4.7 2008 8   auto(15) 4 14
## 55 55          dodge     dakota pickup 4wd 4.7 2008 8   auto(15) 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(14) 4 11
## 58 58          dodge           durango 4wd 3.9 1999 6   auto(14) 4 13
## 59 59          dodge           durango 4wd 4.7 2008 8   auto(15) 4 13
## 60 60          dodge           durango 4wd 4.7 2008 8   auto(15) 4  9
## 61 61          dodge           durango 4wd 4.7 2008 8   auto(15) 4 13
## 62 62          dodge           durango 4wd 5.2 1999 8   auto(14) 4 11
## 63 63          dodge           durango 4wd 5.7 2008 8   auto(15) 4 13
## 64 64          dodge           durango 4wd 5.9 1999 8   auto(14) 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(15) 4  9
## 67 67          dodge   ram 1500 pickup 4wd 4.7 2008 8   auto(15) 4 13
## 68 68          dodge   ram 1500 pickup 4wd 4.7 2008 8   auto(15) 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(14) 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(15) 4 13
## 74 74          dodge   ram 1500 pickup 4wd 5.9 1999 8   auto(14) 4 11
## 75 75           ford        expedition 2wd 4.6 1999 8   auto(14) r 11
## 76 76           ford        expedition 2wd 5.4 1999 8   auto(14) r 11
## 77 77           ford        expedition 2wd 5.4 2008 8   auto(16) r 12
## 78 78           ford          explorer 4wd 4.0 1999 6   auto(15) 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(15) 4 14
## 81 81           ford          explorer 4wd 4.0 2008 6   auto(15) 4 13
## 82 82           ford          explorer 4wd 4.6 2008 8   auto(16) 4 13
## 83 83           ford          explorer 4wd 5.0 1999 8   auto(14) 4 13
## 84 84           ford       f150 pickup 4wd 4.2 1999 6   auto(14) 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(14) 4 13
## 88 88           ford       f150 pickup 4wd 4.6 2008 8   auto(14) 4 13
## 89 89           ford       f150 pickup 4wd 5.4 1999 8   auto(14) 4 11
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## 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
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## 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
## 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
```

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## 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
```

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## 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
```

#b. Which variables from mpg dataset are categorical?

```
str(mpg)
```

```
## 'data.frame':    234 obs. of  12 variables:
##  $ X          : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ manufacturer: chr  "audi" "audi" "audi" "audi" ...
##  $ model       : chr  "a4" "a4" "a4" "a4" ...
##  $ displ       : num  1.8 1.8 2 2 2.8 2.8 3.1 1.8 1.8 2 ...
##  $ year        : int  1999 1999 2008 2008 1999 1999 2008 1999 1999 2008 ...
##  $ cyl         : int  4 4 4 4 6 6 6 4 4 4 ...
##  $ trans       : chr  "auto(l5)" "manual(m5)" "manual(m6)" "auto(av)" ...
##  $ drv         : chr  "f" "f" "f" "f" ...
##  $ cty         : int  18 21 20 21 16 18 18 18 16 20 ...
##  $ hwy         : int  29 29 31 30 26 26 27 26 25 28 ...
##  $ fl          : chr  "p" "p" "p" "p" ...
##  $ class       : chr  "compact" "compact" "compact" "compact" ...
```

#c. Which are continuous variables?

```
continuous_vars <- c("displ", "year", "cyl", "cty", "hwy")
continuous_vars
```

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

#2. Which manufacturer has the most models in this data set? Which model has the most variations?

```
#a. Group the manufacturers and find the unique models. Show your codes and result.
# Assuming 'df' is your data frame

# Get the frequency of each manufacturer
manufacturer_counts <- table(mpg$manufacturer)

# Find the manufacturer with the most models
most_models_manufacturer <- as.character(names(manufacturer_counts)[which.max(manufacturer_counts)])

# Get the frequency of each model
model_counts <- table(mpg$model)

# Find the model with the most variations
most_variations_model <- as.character(names(model_counts)[which.max(model_counts)])

# Print the results
print(paste("The manufacturer with the most models is:", most_models_manufacturer))
```

```
## [1] "The manufacturer with the most models is: dodge"
```

```
print(paste("The model with the most variations is:", most_variations_model))
```

```
## [1] "The model with the most variations is: caravan 2wd"
```

#b. Graph the result by using plot() and ggplot(). Write the codes and its result.

```
# Count the number of unique models for each manufacturer
model_counts <- aggregate(mpg$model, by=list(mpg$manufacturer), FUN=length)
```

```r
# Rename the columns for better readability
colnames(model_counts) <- c("Manufacturer", "Model_Count")

# Create a bar plot to visualize the data
library(ggplot2)
```

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

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

```r
ggplot(model_counts, aes(x=Manufacturer, y=Model_Count)) +
 geom_bar(stat="identity", fill="pink") +
 labs(title="Number of Unique Models by Manufacturer",
      x="Manufacturer",
      y="Number of Models") +
 theme_minimal()
```

Number of Unique Models by Manufacturer
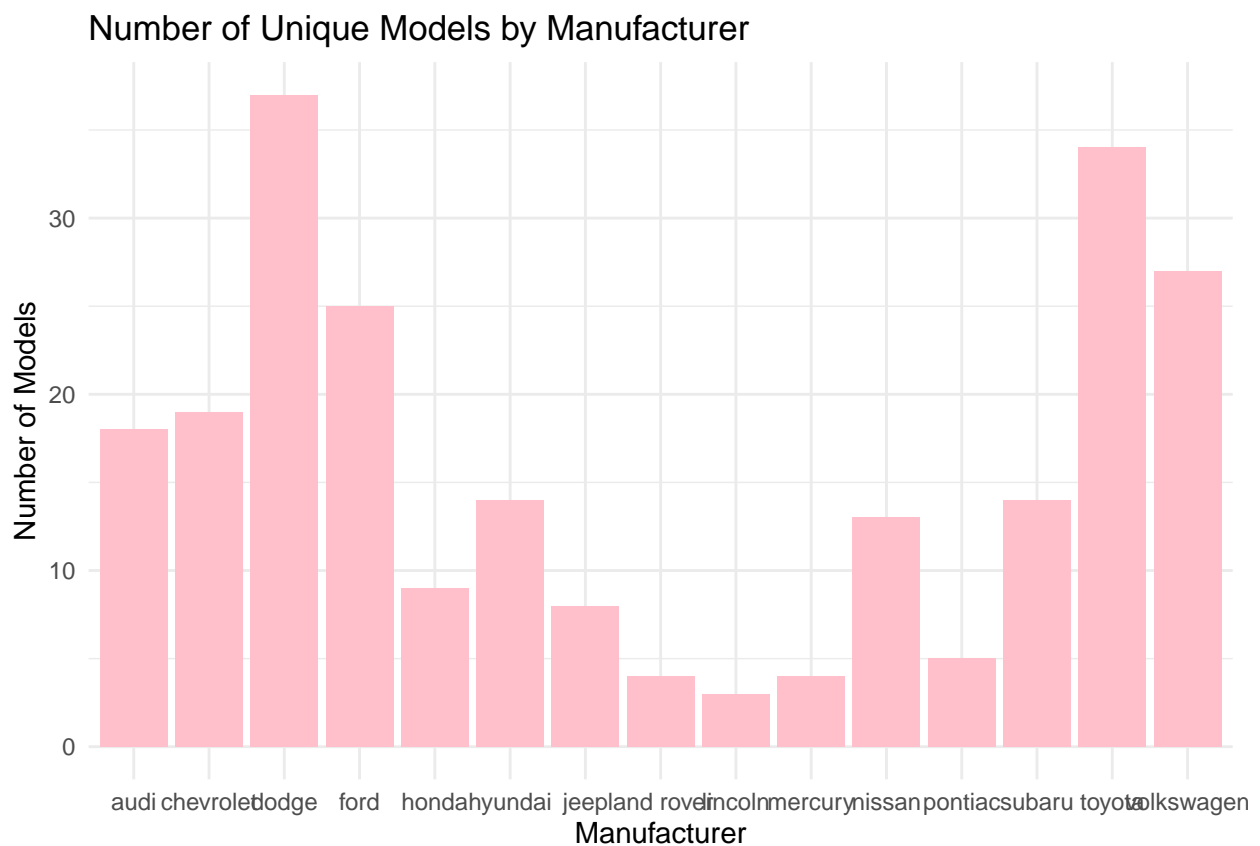
#3. Same dataset will be used. You are going to show the relationship of the model and the manufacturer.

```r
#a. What does ggplot(mpg, aes(model, manufacturer)) + geom_point() show?
```

```r
library(ggplot2)
ggplot(mpg, aes(model, manufacturer)) + geom_point()
```
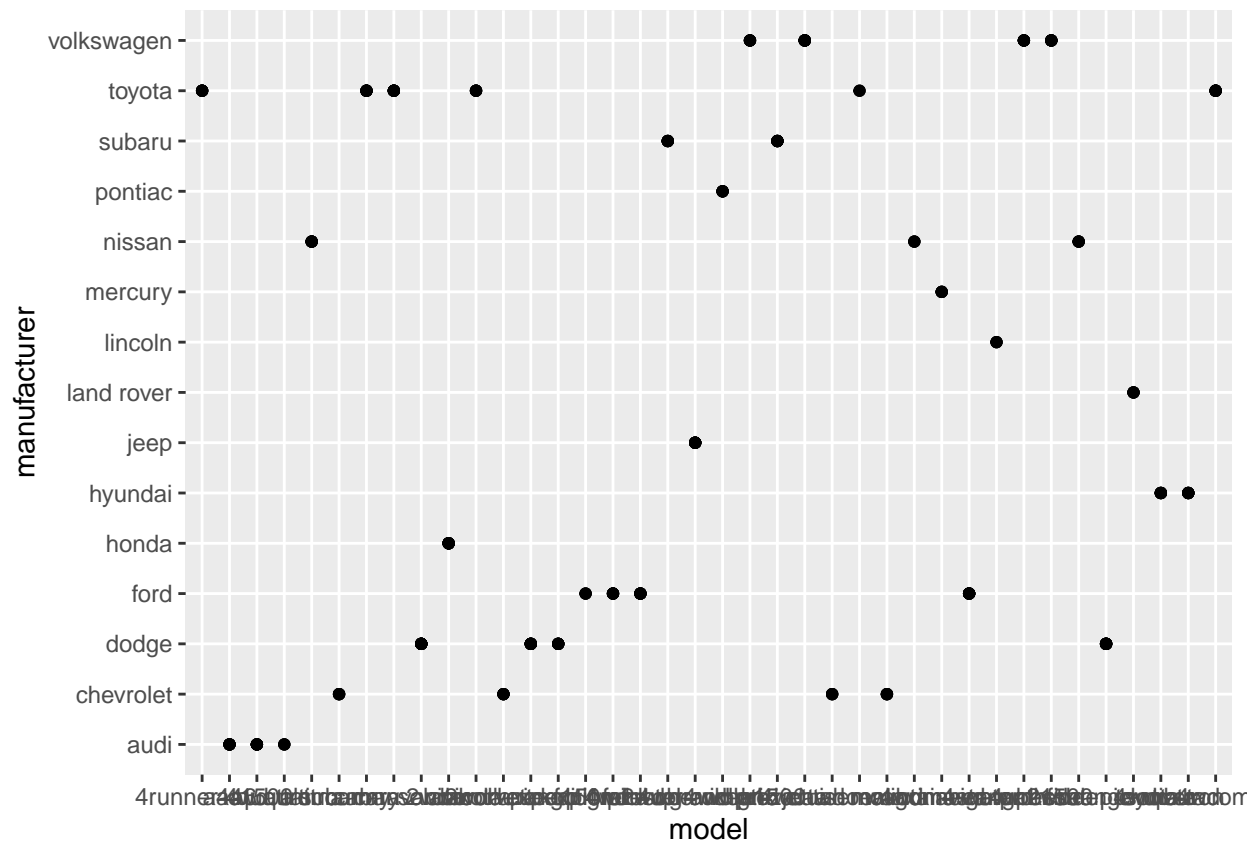
#b. For you, is it useful? If not, how could you modify the data to make it more informative?

#The plot shows the relationship between the model and the manufacturer. It can be useful to visualize

```r
library(ggplot2)

# Assuming your data is stored in a dataframe called "df"

# Display the top 20 observations
head(mpg, 20)
```

```
##     X manufacturer        model displ year cyl        trans drv cty hwy fl
## 1   1         audi           a4   1.8 1999   4    auto(l5)   f  18  29  p
## 2   2         audi           a4   1.8 1999   4  manual(m5)   f  21  29  p
## 3   3         audi           a4   2.0 2008   4  manual(m6)   f  20  31  p
## 4   4         audi           a4   2.0 2008   4    auto(av)   f  21  30  p
## 5   5         audi           a4   2.8 1999   6    auto(l5)   f  16  26  p
## 6   6         audi           a4   2.8 1999   6  manual(m5)   f  18  26  p
## 7   7         audi           a4   3.1 2008   6    auto(av)   f  18  27  p
## 8   8         audi   a4 quattro   1.8 1999   4  manual(m5)   4  18  26  p
## 9   9         audi   a4 quattro   1.8 1999   4    auto(l5)   4  16  25  p
## 10 10         audi   a4 quattro   2.0 2008   4  manual(m6)   4  20  28  p
## 11 11         audi   a4 quattro   2.0 2008   4    auto(s6)   4  19  27  p
## 12 12         audi   a4 quattro   2.8 1999   6    auto(l5)   4  15  25  p
## 13 13         audi   a4 quattro   2.8 1999   6  manual(m5)   4  17  25  p
## 14 14         audi   a4 quattro   3.1 2008   6    auto(s6)   4  17  25  p
## 15 15         audi   a4 quattro   3.1 2008   6  manual(m6)   4  15  25  p
```

```
## 16 16          audi          a6 quattro   2.8 1999    6    auto(l5)   4   15   24   p
## 17 17          audi          a6 quattro   3.1 2008    6    auto(s6)   4   17   25   p
## 18 18          audi          a6 quattro   4.2 2008    8    auto(s6)   4   16   23   p
## 19 19    chevrolet c1500 suburban 2wd   5.3 2008    8    auto(l4)   r   14   20   r
## 20 20    chevrolet c1500 suburban 2wd   5.3 2008    8    auto(l4)   r   11   15   e
##      class
## 1   compact
## 2   compact
## 3   compact
## 4   compact
## 5   compact
## 6   compact
## 7   compact
## 8   compact
## 9   compact
## 10 compact
## 11 compact
## 12 compact
## 13 compact
## 14 compact
## 15 compact
## 16 midsize
## 17 midsize
## 18 midsize
## 19     suv
## 20     suv
```

```r
# Plot the model and the year
ggplot(data = mpg, aes(x = year, y = model, color = as.factor(model))) +
 geom_point(alpha = 0.7) +
 labs(title = "Relationship between Model, Year, and Manufacturer",
      x = "Year",
      y = "Model",
      color = "Manufacturer") +
 theme_minimal()
```

Relationship between Model, Year, and Manufacturer
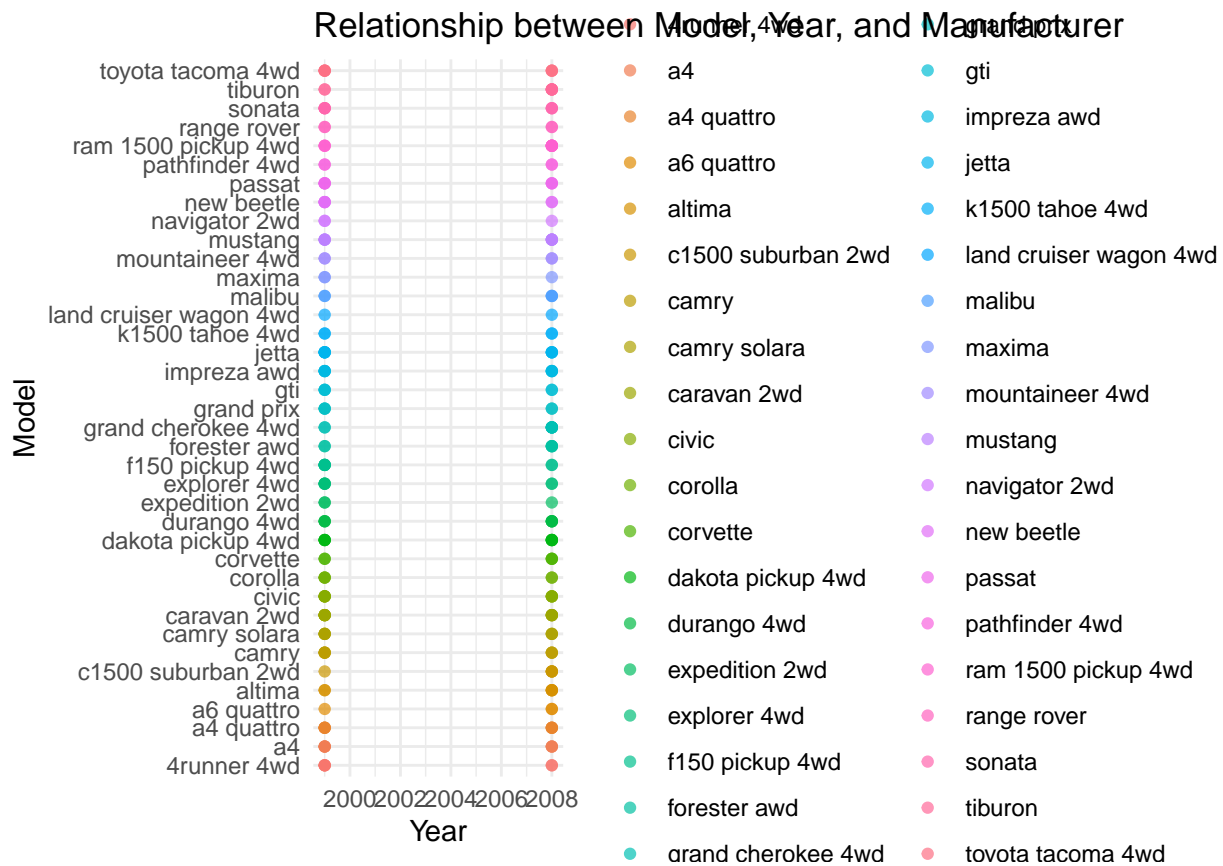
#4. Using the pipe (%>%), group the model and get the number of cars per model. Show codes and its result

```r
#a. Plot using geom_bar() using the top 20 observations only. The graphs should have a title, labels an
```

```r
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
```

```r
library(ggplot2)

# Assuming your data is stored in a dataframe called "df"

# Display the top 20 observations
head(mpg, 20)
```

```
##     X manufacturer          model displ year cyl       trans drv cty hwy fl
## 1   1         audi             a4   1.8 1999   4    auto(l5)   f  18  29  p
## 2   2         audi             a4   1.8 1999   4  manual(m5)   f  21  29  p
## 3   3         audi             a4   2.0 2008   4  manual(m6)   f  20  31  p
```

```
## 4   4          audi               a4  2.0 2008   4   auto(av)  f  21  30  p
## 5   5          audi               a4  2.8 1999   6   auto(l5)  f  16  26  p
## 6   6          audi               a4  2.8 1999   6 manual(m5)  f  18  26  p
## 7   7          audi               a4  3.1 2008   6   auto(av)  f  18  27  p
## 8   8          audi        a4 quattro  1.8 1999   4 manual(m5)  4  18  26  p
## 9   9          audi        a4 quattro  1.8 1999   4   auto(l5)  4  16  25  p
## 10 10          audi        a4 quattro  2.0 2008   4 manual(m6)  4  20  28  p
## 11 11          audi        a4 quattro  2.0 2008   4   auto(s6)  4  19  27  p
## 12 12          audi        a4 quattro  2.8 1999   6   auto(l5)  4  15  25  p
## 13 13          audi        a4 quattro  2.8 1999   6 manual(m5)  4  17  25  p
## 14 14          audi        a4 quattro  3.1 2008   6   auto(s6)  4  17  25  p
## 15 15          audi        a4 quattro  3.1 2008   6 manual(m6)  4  15  25  p
## 16 16          audi        a6 quattro  2.8 1999   6   auto(l5)  4  15  24  p
## 17 17          audi        a6 quattro  3.1 2008   6   auto(s6)  4  17  25  p
## 18 18          audi        a6 quattro  4.2 2008   8   auto(s6)  4  16  23  p
## 19 19     chevrolet c1500 suburban 2wd  5.3 2008   8   auto(l4)  r  14  20  r
## 20 20     chevrolet c1500 suburban 2wd  5.3 2008   8   auto(l4)  r  11  15  e
##      class
## 1  compact
## 2  compact
## 3  compact
## 4  compact
## 5  compact
## 6  compact
## 7  compact
## 8  compact
## 9  compact
## 10 compact
## 11 compact
## 12 compact
## 13 compact
## 14 compact
## 15 compact
## 16 midsize
## 17 midsize
## 18 midsize
## 19     suv
## 20     suv
```

```r
# Group the model and get the number of cars per model
mpg %>%
 group_by(model) %>%
 summarise(count = n()) -> grouped_mpg

# Display the result
print(grouped_mpg)
```

```
## # A tibble: 38 x 2
##    model          count
##    <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
```

```
# Create a dataframe containing the top 20 observations only
top_20 <- mpg %>%
 group_by(model) %>%
 summarise(count = n()) %>%
 arrange(desc(count)) %>%
 head(20)


# Create a plot using geom_bar()
plot <- ggplot(top_20, aes(x = reorder(model, count), y = count, fill = model)) +
 geom_bar(stat = "identity", color = "black") +
 scale_fill_brewer(palette = "Set2") +
 coord_flip() +
 labs(title = "Top 20 Most Popular Car Models",
      x = "Model",
      y = "Number of Cars") +
 theme_minimal() +
 theme(plot.title = element_text(hjust = 0.5),
        axis.text.x = element_text(angle = 45, hjust = 1))

# Display the plot
print(plot)
```

```
## Warning in RColorBrewer::brewer.pal(n, pal): n too large, allowed maximum for palette Set2 is 8
## Returning the palette you asked for with that many colors
```

Top 20 Most Popular Car Models
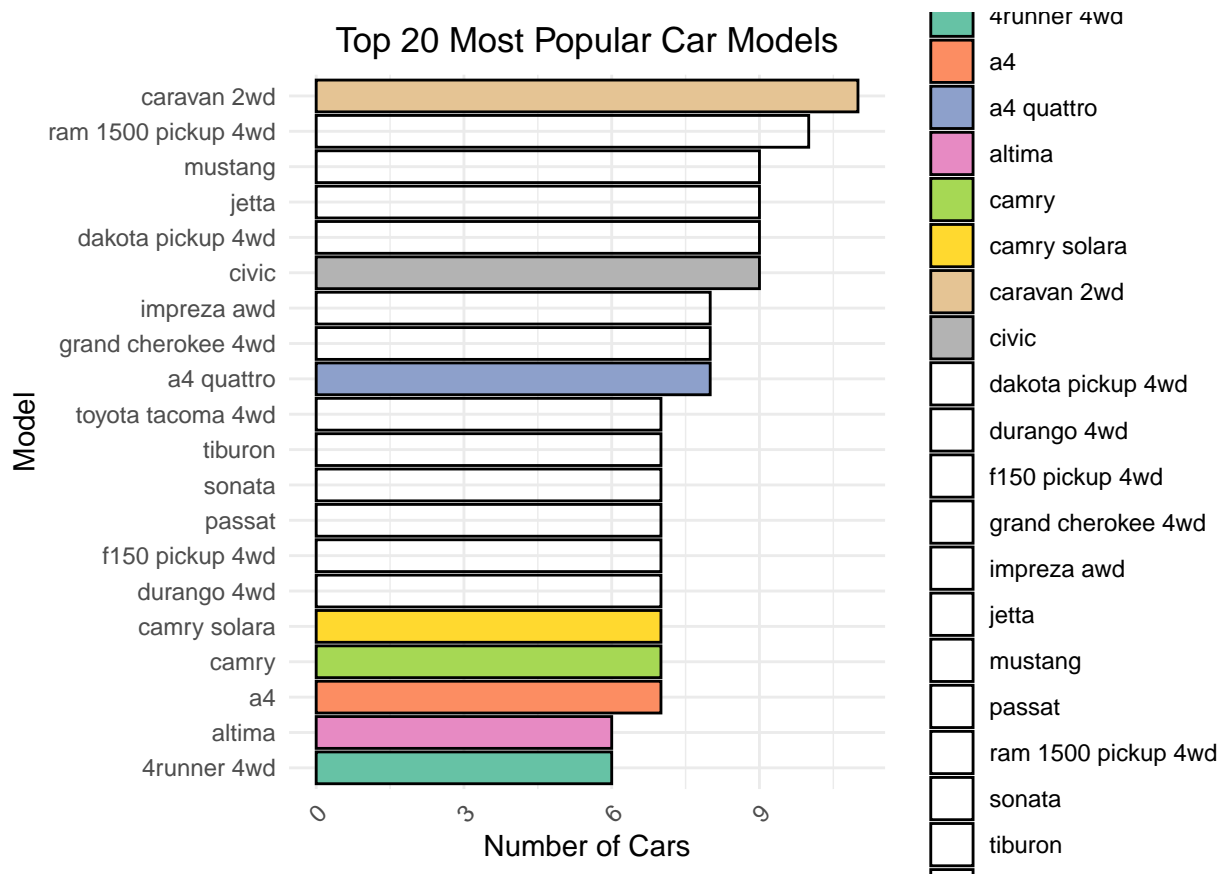
#5. Plot the relationship between cyl - number of cylinders and displ - engine displacement using geom_point with aesthetic color = engine displacement. Title should be "Relationship between No. of Cylinders and Engine Displacement".

```
#a. How would you describe its relationship? Show the codes and its result
# Dummy data
mpg <- data.frame(model = sample(letters[1:20], 1000, replace = TRUE))

# Code for creating the plot
top_20 <- mpg %>%
 group_by(model) %>%
 summarise(count = n()) %>%
 arrange(desc(count)) %>%
 head(20)

top_20 <- top_20 %>%
 group_by(model) %>%
 head(8)

plot <- ggplot(top_20, aes(x = reorder(model, count), y = count, fill = model)) +
 geom_bar(stat = "identity", color = "black") +
 scale_fill_brewer(palette = "Set2") +
 coord_flip() +
 labs(title = "Top 20 Most Popular Car Models",
      x = "Model",
      y = "Number of Cars") +
 theme_minimal() +
```
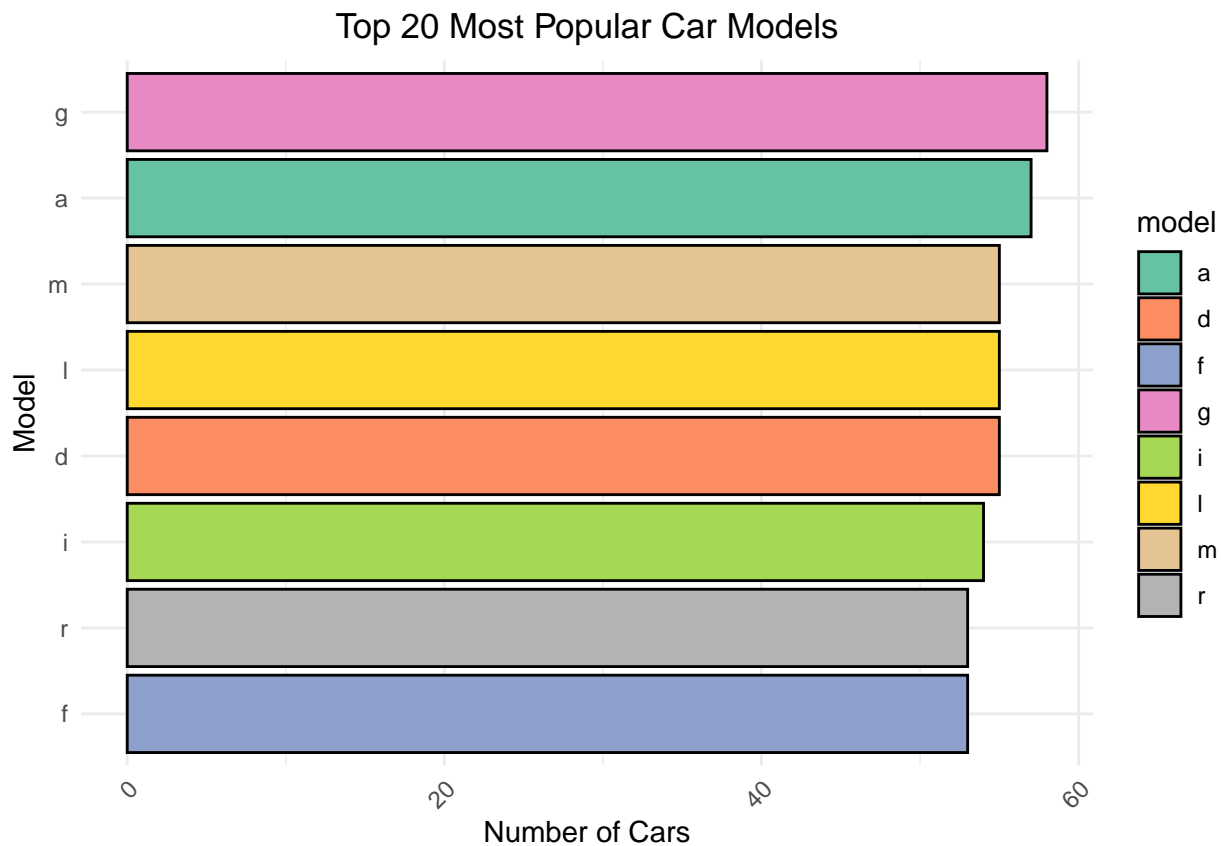
```
 theme(plot.title = element_text(hjust = 0.5),
        axis.text.x = element_text(angle = 45, hjust = 1))

print(plot)
```

Top 20 Most Popular Car Models

#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?

```
#6. Import the traffic.csv onto your R environment.
#a. How many numbers of observation does it have? What are the variables of the traffic dataset the Shou
```

```
#b. subset the traffic dataset into junctions. What is the R codes and its output?
```

```
# c. Plot each junction in a using geom_line(). Show your solution and output.
```

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

```
#a. How many observations does alexa_file has? What about the number of columns? Show your solution and
```

```
#b. group the variations and get the total of each variations. Use dplyr package. Show solution and ans
```

```
#c. Plot the variations using the ggplot() function. What did you observe? Complete the details of the
```

```
#d. Plot a geom_line() with the date and the number of verified reviews. Complete the details of the gr
```

```
#e. Get the relationship of variations and ratings. Which variations got the most highest in rating? Pl
```