RWorksheet_Delatina#4c

Angel

2024-11-01

#1

```r
mpg_data<- read.csv("C:/Documents/RBasics/RWorksheet_Delatina#4C/mpg.csv")
mpg_data
```

```
##       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(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
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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
```

#1b

```
str(mpg_data)
```

```
## '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" ...
```

#2

```
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
```

```
manufacturer_count <- mpg_data %>%
  group_by(manufacturer) %>%
  summarise(model_count = n_distinct(model)) %>%
  arrange(desc(model_count))

most_models <- manufacturer_count[1,]
most_models
```

```
## # A tibble: 1 x 2
##   manufacturer model_count
##   <chr>              <int>
## 1 toyota                 6
```

```
model_variation <- mpg_data %>%
  group_by(model) %>%
  summarise(variation_count = n()) %>%
  arrange(desc(variation_count))

most_variations <- model_variation[1,]
most_variations
```

```
## # A tibble: 1 x 2
##   model       variation_count
##   <chr>                 <int>
## 1 caravan 2wd              11
```

#2b

```
unique_models_by_manufacturer <- mpg_data %>%
  group_by(manufacturer) %>%
  summarise(unique_models = n_distinct(model))

unique_models_by_manufacturer
```

```
## # A tibble: 15 x 2
##    manufacturer unique_models
##    <chr>                <int>
##  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
```

```
barplot(unique_models_by_manufacturer$unique_models,
        names.arg = unique_models_by_manufacturer$manufacturer,
        las = 2, col = "blue",
        main = "Unique Models per Manufacturer",
        ylab = "Number of Unique Models")
```

Unique Models per Manufacturer
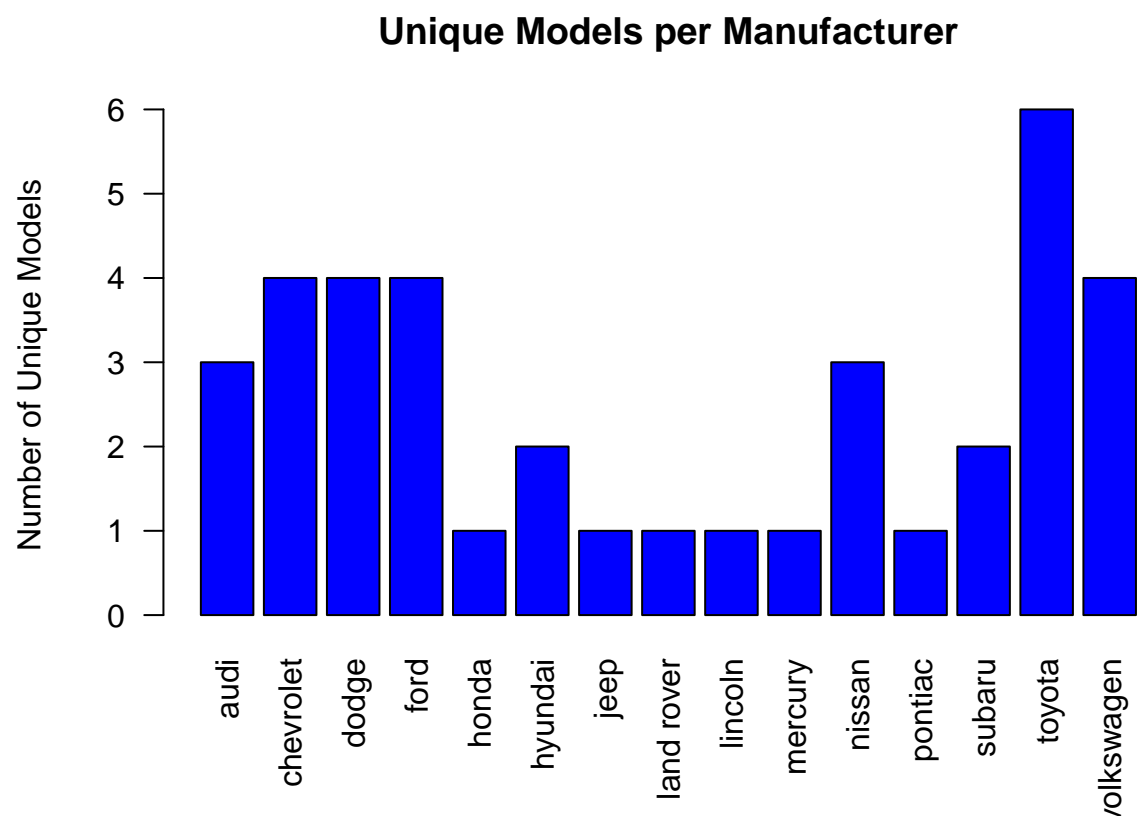

```r
library(ggplot2)

ggplot(unique_models_by_manufacturer, aes(x = reorder(manufacturer, -unique_models), y = unique_models))
  geom_bar(stat = "identity", col = "gray") +
  labs(title = "Unique Models per Manufacturer", x = "Manufacturer", y = "Number of Unique Models") +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```

Unique Models per Manufacturer
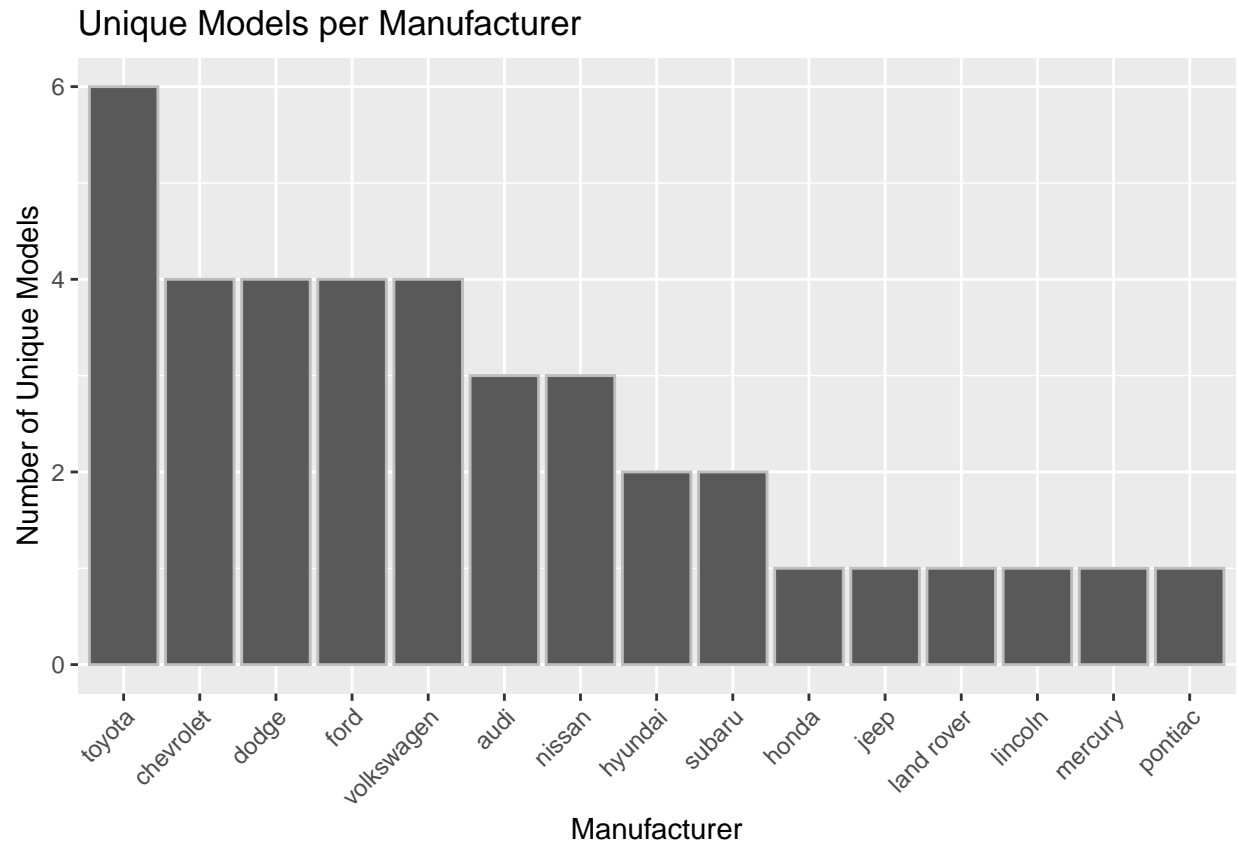

```
ggplot(mpg_data, aes(x = model, y = manufacturer)) +
  geom_jitter(width = 0.3, height = 0.3) +
  labs(title = "Relationship between Model and Manufacturer", x = "Model", y = "Manufacturer")
```

Relationship between Model and Manufacturer


```
ggplot(mpg_data, aes(x = model, y = manufacturer)) +
  geom_count() +
  labs(title = "Relationship between Model and Manufacturer", x = "Model", y = "Manufacturer")
```

Relationship between Model and Manufacturer
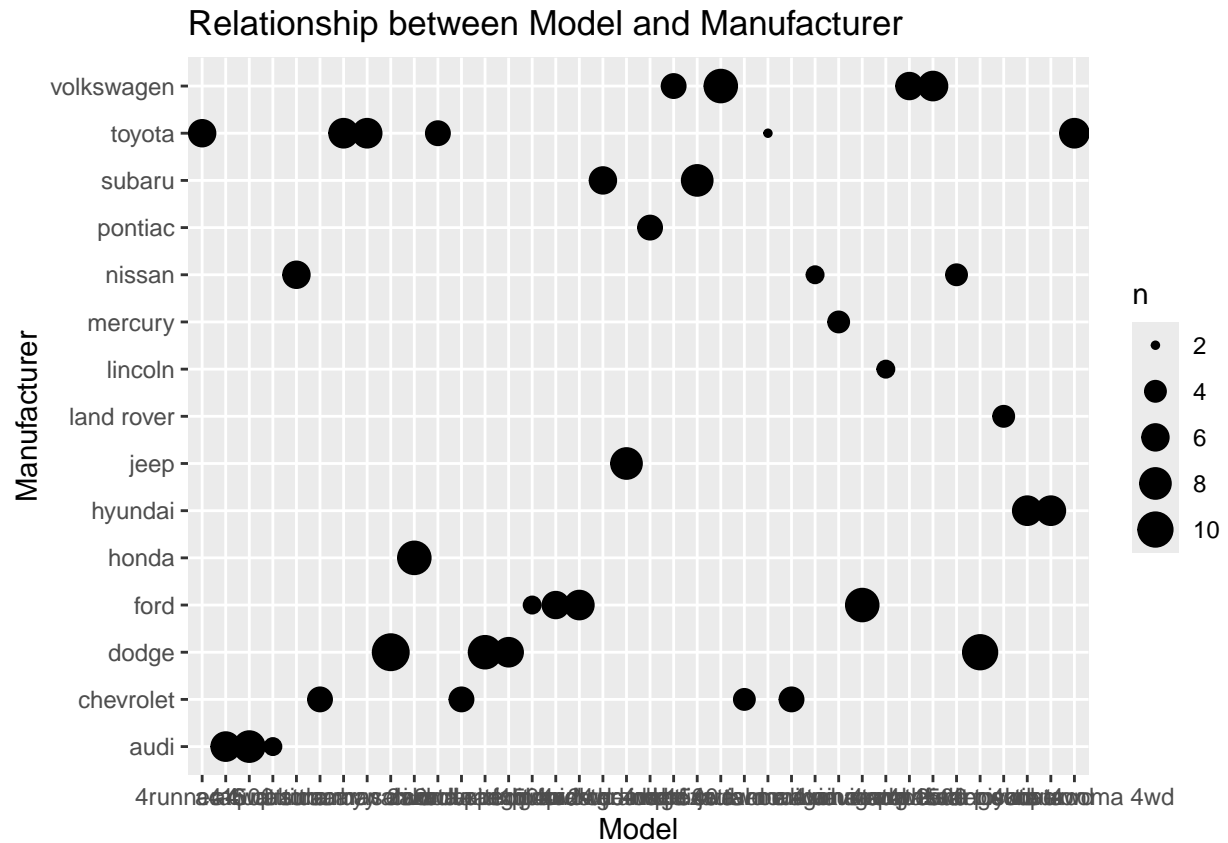
#3

```
top_20_mpg <- mpg_data %>% top_n(20)
```

```
## Selecting by class
```

```
ggplot(top_20_mpg, aes(x = model, y = year)) +
  geom_point() +
  labs(title = "Top 20 Car Models Over Years", x = "Model", y = "Year")
```

Top 20 Car Models Over Years

#4
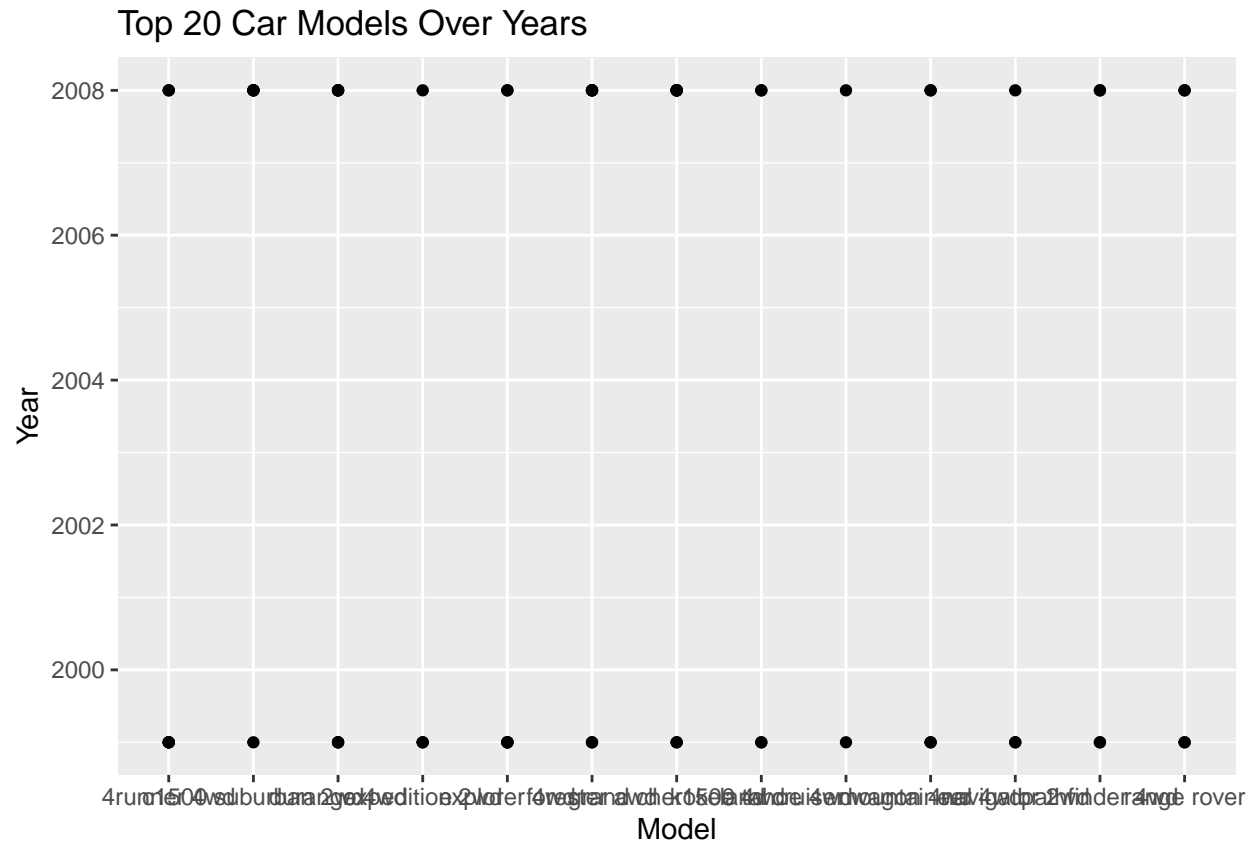
```r
cars_per_model <- mpg_data %>%
  group_by(model) %>%
  summarise(count = n())

cars_per_model
```

```
## # 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
```

#4a

```
ggplot(cars_per_model %>% top_n(20), aes(x = reorder(model, -count), y = count)) +
  geom_bar(stat = "identity", fill = "green") +
  labs(title = "Top 20 Models by Count", x = "Model", y = "Count") +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```

Selecting by count

Top 20 Models by Count
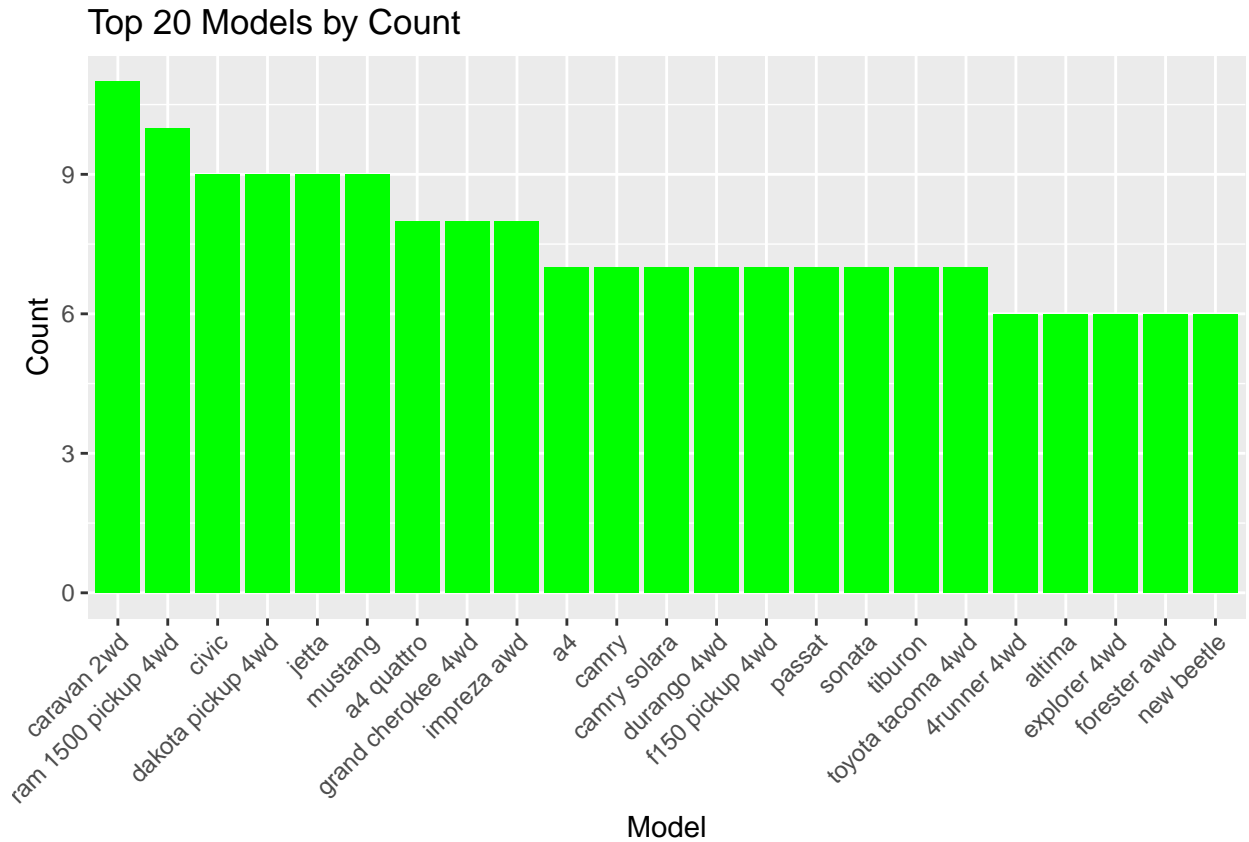
#4b

```
ggplot(cars_per_model %>% top_n(20), aes(x = reorder(model, -count), y = count)) +
  geom_bar(stat = "identity", fill = "purple") +
  labs(title = "Top 20 Models by Count", x = "Model", y = "Count") +
  coord_flip()
```

Selecting by count

Top 20 Models by Count

#5
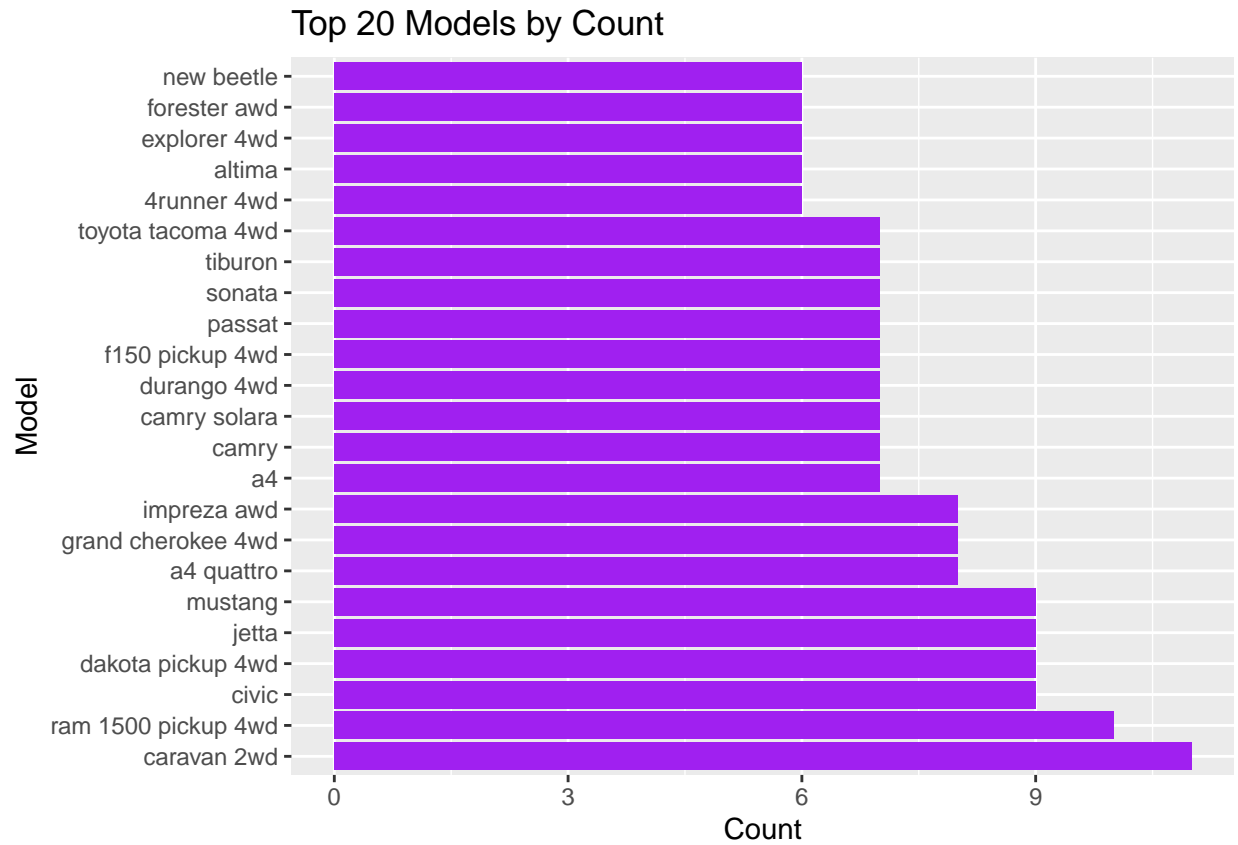
```r
ggplot(mpg_data, aes(x = cyl, y = displ, color = displ)) +
  geom_point() +
  labs(title = "Relationship between No. of Cylinders and Engine Displacement")
```

Relationship between No. of Cylinders and Engine Displacement
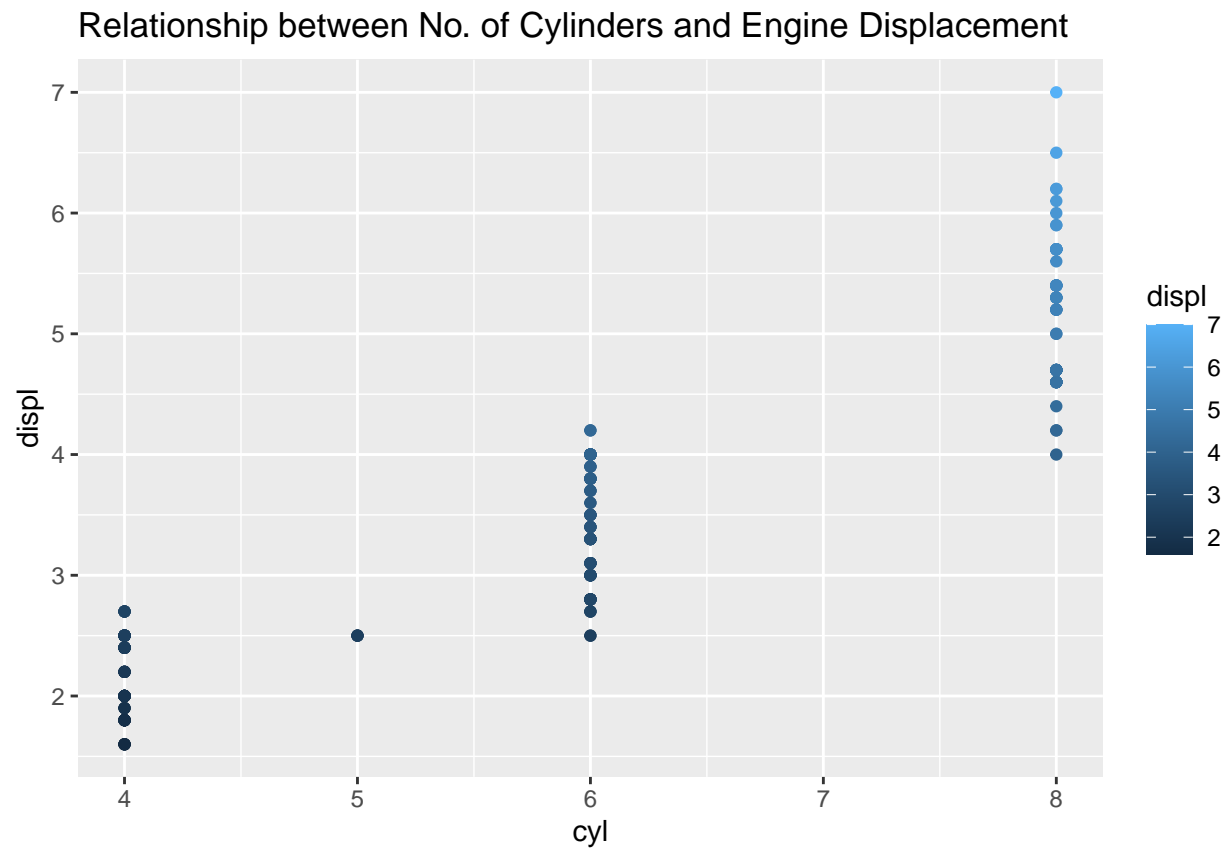
#5b

```
ggplot(mpg_data, aes(x = displ, y = hwy, color = cty)) +
  geom_point() +
  labs(title = "Relationship between Engine Displacement and Highway MPG")
```

Relationship between Engine Displacement and Highway MPG

#6
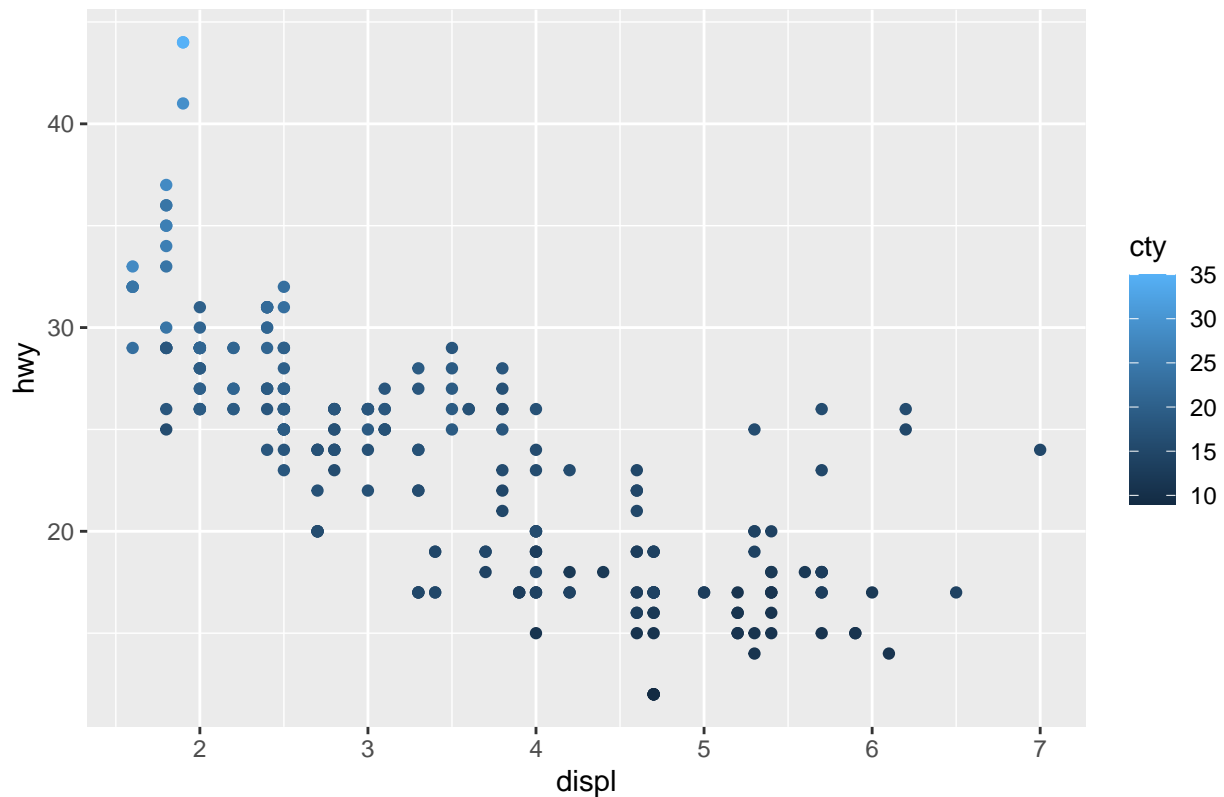
```r
traffic_data<- read.csv("C:/Documents/RBasics/RWorksheet_Delatina#4C/traffic.csv")
dim(traffic_data)
```

```
## [1] 48120     4
```

```r
str(traffic_data)
```

```
## 'data.frame':    48120 obs. of  4 variables:
##  $ DateTime: chr  "2015-11-01 00:00:00" "2015-11-01 01:00:00" "2015-11-01 02:00:00" "2015-11-01 03:00
##  $ Junction: int  1 1 1 1 1 1 1 1 1 1 ...
##  $ Vehicles: int  15 13 10 7 9 6 9 8 11 12 ...
##  $ ID      : num  2.02e+10 2.02e+10 2.02e+10 2.02e+10 2.02e+10 ...
```

```r
num_observations <- nrow(traffic_data)
variables <- colnames(traffic_data)

num_observations
```

```
## [1] 48120
```

```
variables
```

```
## [1] "DateTime" "Junction" "Vehicles" "ID"
```

#6b

```
Junction <- traffic_data %>%
  filter(Junction == "true")

head(Junction)
```

```
## [1] DateTime Junction Vehicles ID
## <0 rows> (or 0-length row.names)
```

#6c

```
library(ggplot2)
ggplot(traffic_data, aes(x = as.POSIXct(DateTime), y = Vehicles, color = Junction)) +
  geom_line() +
  labs(title = "Traffic Count by Junction Over Time", x = "DateTime", y = "Number of Vehicles") +
  theme_minimal()
```
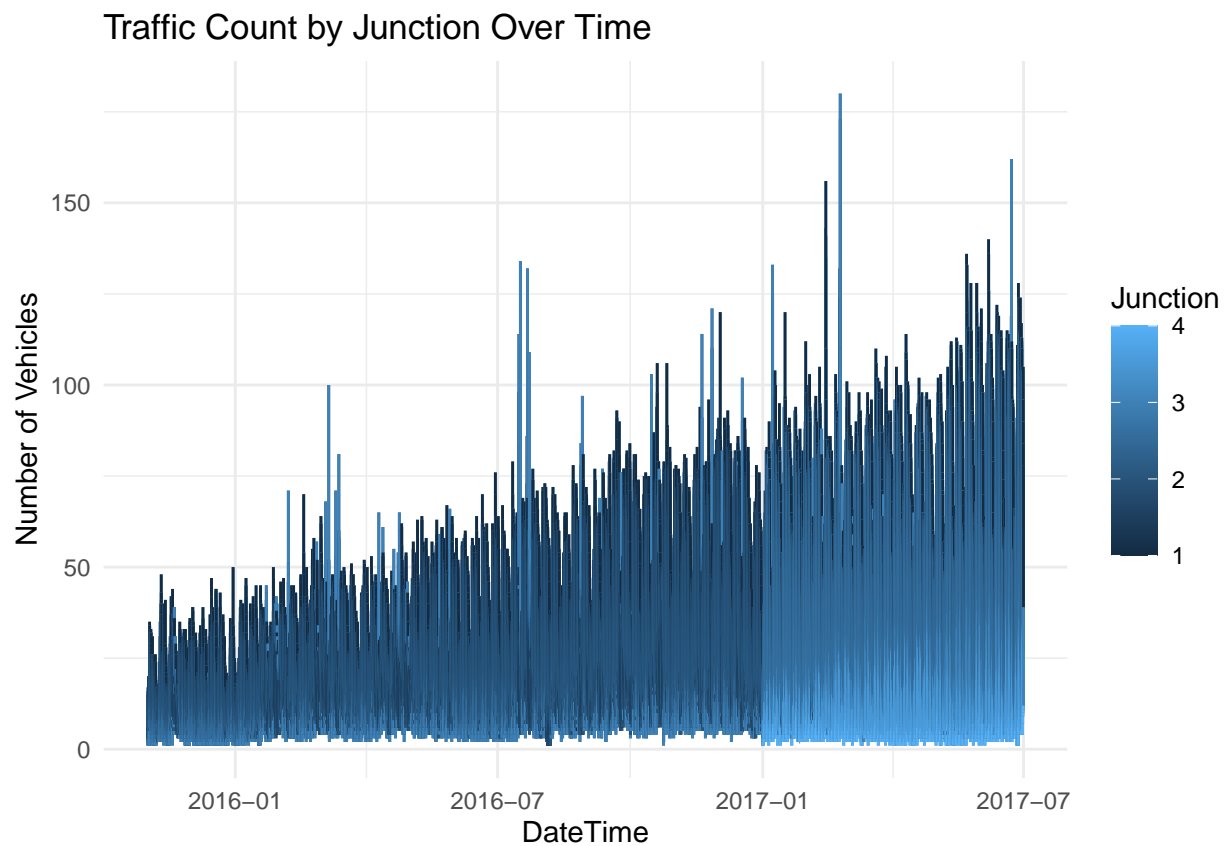
```
colnames(traffic_data)  # Or colnames(junctions) if you're using the subset
```

```
## [1] "DateTime" "Junction" "Vehicles" "ID"
```

#7

```
library(readxl)
alexa_data<-read_excel("C:/Documents/RBasics/RWorksheet_Delatina#4B/alexa_file.xlsx")
dim(alexa_data)
```

```
## [1] 3150    5
```

#7b

```
library(dplyr)

variation_count <- alexa_data %>%
  group_by(variation) %>%
  summarise(total = n())

variation_count
```

```
## # A tibble: 16 x 2
##    variation                   total
##    <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

```
ggplot(variation_count, aes(x = variation, y = total)) +
  geom_bar(stat = "identity") +
  labs(title = "Total Count of Variations", x = "Variation", y = "Total Count")
```

Total Count of Variations

#7d
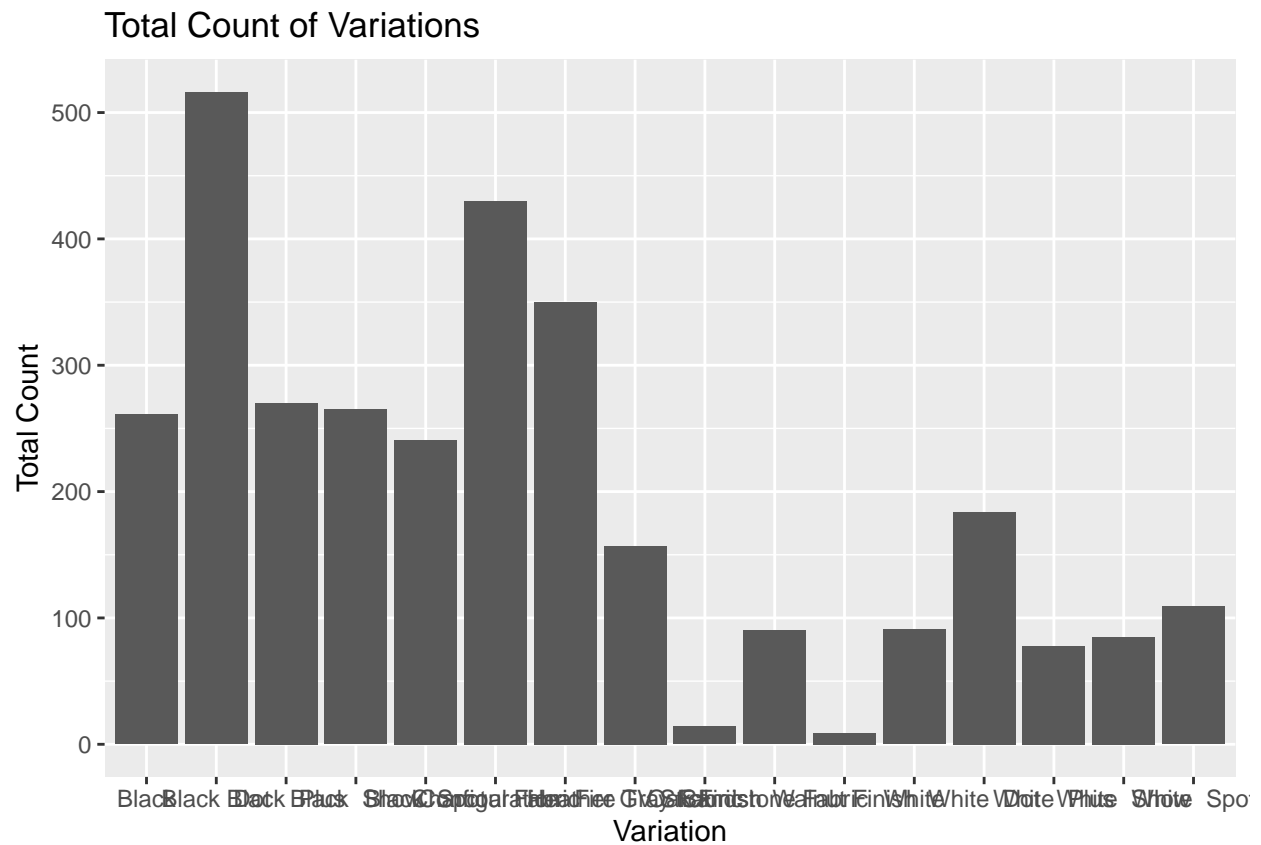
```r
ggplot(alexa_data, aes(x = date, y = verified_reviews)) +
  geom_line() +
  labs(title = "Verified Reviews Over Time", x = "Date", y = "Number of Verified Reviews")
```

are some serious flaws, particularly if you are the last one to bed or the first to wake. It doesn't seem like the engineer

expensive alternative option to fill the gap. Ordered the Amazon Fire Stick from Best Buy. Instructions were short and

one of the lights by saying "Alexa, turn off the second light". In the Alexa app, I created a 'Group' with &#34
out lately I've been getting terrible support. The guy that took my call just rambled off a (completely unhelpful) script an

```
geom_line
```

```
## function (mapping = NULL, data = NULL, stat = "identity", position = "identity",
##     na.rm = FALSE, orientation = NA, show.legend = NA, inherit.aes = TRUE,
##     ...)
## {
##     layer(data = data, mapping = mapping, stat = stat, geom = GeomLine,
##         position = position, show.legend = show.legend, inherit.aes = inherit.aes,
##         params = list2(na.rm = na.rm, orientation = orientation,
##             ...))
## }
## <bytecode: 0x00000290bfc987a0>
## <environment: namespace:ggplot2>
```

#7e

```
ggplot(alexa_data, aes(x = variation, y = rating)) +
  geom_point() +
  labs(title = "Variation Ratings", x = "Variation", y = "Ratings")
```

Variation Ratings