# Rworksheet\_Delgado#6

### JR Delgado

#### 2022-11-25

```
Worksheet-6 Worksheet for R Programming
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
library(ggplot2)
mpg1 <- as.data.frame(mpg)</pre>
mpg1
##
       manufacturer
                                       model displ year cyl
                                                                   trans drv cty hwy
## 1
                                                1.8 1999
                                                                               18
                audi
                                                                auto(15)
                                                                           f
                                                                                   29
                                          a4
## 2
                audi
                                                1.8 1999
                                                           4 manual(m5)
                                                                               21
                                                                                   29
## 3
                                                                               20
                audi
                                          a4
                                                2.0 2008
                                                           4 manual(m6)
                                                                           f
                                                                                   31
## 4
                audi
                                          a4
                                                2.0 2008
                                                                auto(av)
                                                                           f
                                                                              21
                                                                                   30
## 5
                                                2.8 1999
                                                                                   26
                audi
                                          a4
                                                           6
                                                                auto(15)
                                                                           f
                                                                              16
## 6
                                                2.8 1999
                                                           6 manual(m5)
                                                                           f
                                                                              18
                                                                                   26
                audi
                                          a4
                                                                                   27
## 7
                                          a4
                                                3.1 2008
                                                                auto(av)
                                                                           f
                                                                              18
               audi
## 8
               audi
                                  a4 quattro
                                                1.8 1999
                                                           4 manual(m5)
                                                                           4
                                                                              18
                                                                                   26
## 9
                                  a4 quattro
                                                                              16
                                                                                   25
                audi
                                                1.8 1999
                                                                auto(15)
                                                                           4
## 10
                                                                               20
                audi
                                  a4 quattro
                                                2.0 2008
                                                           4 manual(m6)
                                                                           4
                                                                                   28
## 11
                                  a4 quattro
                                                2.0 2008
                                                                auto(s6)
                                                                           4
                                                                              19
                                                                                   27
               audi
## 12
                audi
                                  a4 quattro
                                                2.8 1999
                                                                auto(15)
                                                                           4
                                                                              15
                                                                                   25
## 13
                                                2.8 1999
                                                                              17
                                                                                   25
               audi
                                  a4 quattro
                                                           6 manual(m5)
                                                                           4
               audi
## 14
                                  a4 quattro
                                                3.1 2008
                                                           6
                                                                auto(s6)
                                                                           4
                                                                              17
                                                                                   25
## 15
                audi
                                  a4 quattro
                                                3.1 2008
                                                           6 manual(m6)
                                                                              15
                                                                                   25
## 16
                audi
                                  a6 quattro
                                                2.8 1999
                                                                auto(15)
                                                                           4
                                                                             15
                                                                                   24
                                                           6
## 17
                audi
                                  a6 quattro
                                                3.1 2008
                                                                auto(s6)
                                                                           4
                                                                              17
                                                                                   25
                                                           6
## 18
                                                                           4
                                                                              16
                                                                                   23
                audi
                                  a6 quattro
                                                4.2 2008
                                                                auto(s6)
## 19
          chevrolet
                         c1500 suburban 2wd
                                                5.3 2008
                                                                auto(14)
                                                                           r
                                                                              14
                                                                                   20
                                                5.3 2008
## 20
          chevrolet
                         c1500 suburban 2wd
                                                           8
                                                                auto(14)
                                                                                   15
                                                                              11
                                                                           r
```

5.3 2008

auto(14)

14

c1500 suburban 2wd

## 21

chevrolet

##	22	chevrolet	c1500 suburban	2wd 5	5.7	1999	8	auto(14)	r	13	17
	23	chevrolet	c1500 suburban			2008	8	auto(14)	r	12	17
	24	chevrolet	corve			1999	8	manual(m6)	r	16	26
	25	chevrolet	corve			1999	8	auto(14)	r	15	23
	26	chevrolet	corve			2008	8	manual(m6)	r	16	26
	27	chevrolet	corve			2008	8	auto(s6)	r	15	25
	28	chevrolet	corve			2008	8	manual(m6)	r	15	24
##	29	chevrolet	k1500 tahoe			2008	8	auto(14)	4	14	19
##	30	chevrolet	k1500 tahoe			2008	8	auto(14)	4	11	14
	31	chevrolet	k1500 tahoe			1999	8	auto(14)	4	11	15
	32	chevrolet	k1500 tahoe			1999	8	auto(14)	4	14	17
##	33	chevrolet	mal	ibu 2	2.4	1999	4	auto(14)	f	19	27
##	34	chevrolet	mal	ibu 2	2.4	2008	4	auto(14)	f	22	30
##	35	chevrolet	mal	ibu 3	3.1	1999	6	auto(14)	f	18	26
##	36	chevrolet	mal	ibu 3	3.5	2008	6	auto(14)	f	18	29
##	37	chevrolet	mal	ibu 3	3.6	2008	6	auto(s6)	f	17	26
##	38	dodge	caravan	2wd 2	2.4	1999	4	auto(13)	f	18	24
##	39	dodge	caravan	2wd 3	3.0	1999	6	auto(14)	f	17	24
##	40	dodge	caravan	2wd 3	3.3	1999	6	auto(14)	f	16	22
##	41	dodge	caravan	2wd 3	3.3	1999	6	auto(14)	f	16	22
##	42	dodge	caravan	2wd 3	3.3	2008	6	auto(14)	f	17	24
##	43	dodge	caravan	2wd 3	3.3	2008	6	auto(14)	f	17	24
##	44	dodge	caravan	2wd 3	3.3	2008	6	auto(14)	f	11	17
##	45	dodge	caravan	2wd 3	3.8	1999	6	auto(14)	f	15	22
##	46	dodge	caravan	2wd 3	3.8	1999	6	auto(14)	f	15	21
##	47	dodge	caravan		3.8	2008	6	auto(16)	f	16	23
##	48	dodge	caravan	2wd 4	1.0	2008	6	auto(16)	f	16	23
##	49	dodge	dakota pickup	4wd 3	3.7	2008	6	manual(m6)	4	15	19
##	50	dodge	dakota pickup			2008	6	auto(14)	4	14	18
	51	dodge	dakota pickup			1999	6	auto(14)	4	13	17
	52	dodge	dakota pickup			1999	6	manual(m5)	4	14	17
	53	dodge	dakota pickup			2008	8	auto(15)	4	14	19
	54	dodge	dakota pickup			2008	8	auto(15)	4	14	19
	55	dodge	dakota pickup			2008	8	auto(15)	4	9	12
	56	dodge	dakota pickup			1999	8	manual(m5)	4	11	17
	57	dodge	dakota pickup			1999	8	auto(14)	4	11	15
##		dodge	durango			1999	6	auto(14)	4	13	17
	59	dodge	durango			2008	8	auto(15)	4	13	17
	60	dodge	durango			2008	8	auto(15)	4	9	12
	61	dodge	durango			2008	8	auto(15)	4	13	17
##	62 63	dodge	durango			1999	8 8	auto(14)	4 4	11 13	16
	64	dodge	durango			<ul><li>2008</li><li>1999</li></ul>	8	auto(15) auto(14)	4	11	18 15
##	65	dodge dodge	durango ram 1500 pickup			2008		manual(m6)	4	12	16
##	66	dodge	ram 1500 pickup			2008	8	auto(15)	4	9	12
##	67	dodge	ram 1500 pickup			2008	8	auto(15)	4	13	17
##	68	dodge	ram 1500 pickup			2008	8	auto(15)	4	13	17
##	69	dodge	ram 1500 pickup			2008		manual(m6)	4	12	16
	70	dodge	ram 1500 pickup			2008		manual(m6)	4	9	12
	71	dodge	ram 1500 pickup			1999	8	auto(14)	4	11	15
	72	dodge	ram 1500 pickup			1999		manual(m5)	4	11	16
	73	dodge	ram 1500 pickup			2008	8	auto(15)	4	13	17
##	74	dodge	ram 1500 pickup			1999	8	auto(14)	4	11	15
##	75	ford	expedition	2wd 4	1.6	1999	8	auto(14)	r	11	17

##	76	ford	expedition 2wd	5.4 19	999 8	auto(14)	r	11	17
##		ford	expedition 2wd	5.4 20		auto(16)	r	12	18
	78	ford	explorer 4wd	4.0 19		auto(15)	4	14	17
	79	ford	explorer 4wd	4.0 19		manual(m5)	4	15	19
##	80	ford	explorer 4wd	4.0 19		auto(15)	4	14	17
##		ford	explorer 4wd	4.0 20		auto(15)	4	13	19
	82	ford	explorer 4wd	4.6 20			4	13	19
##	83	ford	explorer 4wd	5.0 19			4	13	17
##	84	ford	f150 pickup 4wd	4.2 19		auto(14)	4	14	17
##	85	ford	f150 pickup 4wd	4.2 19		manual(m5)	4	14	17
##	86	ford	f150 pickup 4wd	4.6 19	999 8	manual(m5)	4	13	16
##	87	ford	f150 pickup 4wd	4.6 19	999 8	auto(14)	4	13	16
##	88	ford	f150 pickup 4wd	4.6 20	8 800	auto(14)	4	13	17
##	89	ford	f150 pickup 4wd	5.4 19		auto(14)	4	11	15
##	90	ford	f150 pickup 4wd	5.4 20	8 800	auto(14)	4	13	17
##	91	ford	mustang	3.8 19	999 6	manual(m5)	r	18	26
##	92	ford	mustang	3.8 19	999 6	auto(14)	r	18	25
##	93	ford	mustang	4.0 20	008 6	manual(m5)	r	17	26
##	94	ford	mustang	4.0 20	008 6	auto(15)	r	16	24
##	95	ford	mustang	4.6 19	999 8	auto(14)	r	15	21
##	96	ford	mustang	4.6 19	999 8	manual(m5)	r	15	22
##	97	ford	mustang	4.6 20	8 800	manual(m5)	r	15	23
##	98	ford	${ t mustang}$	4.6 20	8 800	auto(15)	r	15	22
##	99	ford	mustang	5.4 20	8 800	manual(m6)	r	14	20
##	100	honda	civic	1.6 19	999 4	manual(m5)	f	28	33
##	101	honda	civic	1.6 19		auto(14)	f	24	32
##	102	honda	civic	1.6 19		manual(m5)	f	25	32
##	103	honda	civic	1.6 19		manual(m5)	f	23	29
##	104	honda	civic	1.6 19		auto(14)	f	24	32
##	105	honda	civic	1.8 20		manual(m5)	f	26	34
##	106	honda	civic	1.8 20			f	25	36
##	107	honda	civic	1.8 20			f	24	36
##	108	honda	civic	2.0 20		manual(m6)	f	21	29
	109	hyundai	sonata	2.4 19		auto(14)	f	18	26
	110	hyundai	sonata	2.4 19		manual(m5)	f	18	27
##	111	hyundai	sonata	2.4 20		auto(14)	f	21	30
	112	hyundai	sonata	2.4 20		manual(m5)	f	21	31
##	113	hyundai	sonata	2.5 19		auto(14)	f	18	26
	114	hyundai	sonata	2.5 19		manual(m5)	f	18	26
##	115 116	hyundai	sonata	3.3 20 2.0 19		auto(15)	f f	19 19	28 26
##	117	hyundai hyundai	tiburon tiburon	2.0 19		auto(14) manual(m5)	f	19	29
##	118	hyundai	tiburon	2.0 18		manual(m5)	f	20	28
##	119	hyundai	tiburon	2.0 20		auto(14)	f	20	27
	120	hyundai	tiburon	2.7 20		auto(14)	f	17	24
	121	hyundai	tiburon	2.7 20		manual(m6)	f	16	24
	122	hyundai	tiburon	2.7 20		manual(m5)	f	17	24
	123	jeep	grand cherokee 4wd	3.0 20		auto(15)	4	17	22
	124	jeep	grand cherokee 4wd	3.7 20		auto(15)	4	15	19
	125	jeep	grand cherokee 4wd	4.0 19		auto(14)	4	15	20
	126	jeep	grand cherokee 4wd	4.7 19		auto(14)	4	14	17
	127	jeep	grand cherokee 4wd	4.7 20		auto(15)	4	9	12
##	128	jeep	grand cherokee 4wd	4.7 20	8 800	auto(15)	4	14	19
##	129	jeep	grand cherokee 4wd	5.7 20	8 800	auto(15)	4	13	18

```
## 130
                           grand cherokee 4wd
                                                   6.1 2008
                                                                    auto(15)
                                                                                4
                                                                                    11
                                                                                        14
                 jeep
                                                               8
                                                   4.0 1999
##
  131
                                                                                4
                                                                                    11
                                                                                        15
          land rover
                                                               8
                                                                    auto(14)
                                   range rover
##
   132
          land rover
                                   range rover
                                                   4.2 2008
                                                                    auto(s6)
                                                                                4
                                                                                    12
                                                                                        18
   133
##
          land rover
                                                   4.4 2008
                                                                    auto(s6)
                                                                                4
                                                                                    12
                                                                                        18
                                   range rover
                                                               8
##
   134
          land rover
                                   range rover
                                                   4.6 1999
                                                               8
                                                                    auto(14)
                                                                                4
                                                                                    11
                                                                                        15
##
   135
             lincoln
                                                   5.4 1999
                                                                                    11
                                 navigator 2wd
                                                               8
                                                                    auto(14)
                                                                                        17
                                                                                r
             lincoln
                                                   5.4 1999
##
  136
                                 navigator 2wd
                                                                8
                                                                    auto(14)
                                                                                r
                                                                                    11
                                                                                        16
## 137
             lincoln
                                 navigator 2wd
                                                   5.4 2008
                                                               8
                                                                    auto(16)
                                                                                r
                                                                                    12
                                                                                        18
##
   138
             mercury
                              mountaineer 4wd
                                                   4.0 1999
                                                               6
                                                                    auto(15)
                                                                                4
                                                                                    14
                                                                                        17
                                                                                        19
##
  139
             mercury
                              mountaineer 4wd
                                                   4.0 2008
                                                                6
                                                                    auto(15)
                                                                                 4
                                                                                    13
##
   140
             mercury
                              mountaineer 4wd
                                                   4.6 2008
                                                                    auto(16)
                                                                                4
                                                                                    13
                                                                                        19
##
   141
                                                   5.0 1999
                                                                                    13
                                                                                        17
             mercury
                              mountaineer 4wd
                                                                8
                                                                    auto(14)
                                                                                4
##
   142
                                         altima
                                                   2.4 1999
                                                                4 manual(m5)
                                                                                f
                                                                                    21
                                                                                        29
              nissan
## 143
                                                                                f
              nissan
                                         altima
                                                   2.4 1999
                                                                    auto(14)
                                                                                    19
                                                                                        27
## 144
                                                   2.5 2008
                                                                                f
                                                                                    23
                                                                                        31
              nissan
                                         altima
                                                                    auto(av)
## 145
              nissan
                                         altima
                                                   2.5 2008
                                                                4 manual(m6)
                                                                                f
                                                                                    23
                                                                                        32
  146
                                                   3.5 2008
                                                                                f
                                                                                    19
                                                                                        27
##
                                                                6 manual(m6)
              nissan
                                         altima
##
   147
                                                   3.5 2008
                                                                    auto(av)
                                                                                f
                                                                                    19
                                                                                        26
              nissan
                                         altima
##
  148
                                                   3.0 1999
                                                                                    18
                                                                                        26
              nissan
                                         maxima
                                                                    auto(14)
                                                                                f
##
   149
              nissan
                                         maxima
                                                   3.0 1999
                                                                6 manual(m5)
                                                                                f
                                                                                    19
                                                                                        25
   150
##
              nissan
                                         maxima
                                                   3.5 2008
                                                                    auto(av)
                                                                                f
                                                                                    19
                                                                                        25
##
   151
                                pathfinder 4wd
                                                   3.3 1999
                                                                    auto(14)
                                                                                4
                                                                                    14
                                                                                        17
              nissan
                                                   3.3 1999
                                                                                    15
## 152
                                pathfinder 4wd
                                                                6 manual(m5)
                                                                                4
                                                                                        17
              nissan
                                pathfinder 4wd
                                                   4.0 2008
                                                                                4
                                                                                    14
                                                                                        20
##
   153
              nissan
                                                                6
                                                                    auto(15)
                                                                                    12
                                                                                4
                                                                                        18
## 154
              nissan
                                pathfinder 4wd
                                                   5.6 2008
                                                                8
                                                                    auto(s5)
   155
             pontiac
                                    grand prix
                                                   3.1 1999
                                                                6
                                                                    auto(14)
                                                                                f
                                                                                    18
                                                                                        26
##
   156
                                                   3.8 1999
                                                                                f
                                                                                    16
                                                                                        26
             pontiac
                                    grand prix
                                                                6
                                                                    auto(14)
                                                                                        27
##
   157
             pontiac
                                    grand prix
                                                   3.8 1999
                                                                6
                                                                    auto(14)
                                                                                f
                                                                                    17
##
  158
                                                   3.8 2008
                                                                                f
                                                                                    18
                                                                                        28
             pontiac
                                    grand prix
                                                                    auto(14)
## 159
                                                   5.3 2008
                                                                8
                                                                    auto(s4)
                                                                                f
                                                                                    16
                                                                                        25
             pontiac
                                    grand prix
## 160
              subaru
                                  forester awd
                                                   2.5
                                                       1999
                                                                4 manual(m5)
                                                                                4
                                                                                    18
                                                                                        25
##
   161
               subaru
                                  forester awd
                                                   2.5 1999
                                                                    auto(14)
                                                                                4
                                                                                    18
                                                                                        24
##
   162
               subaru
                                  forester awd
                                                   2.5
                                                       2008
                                                                4 manual(m5)
                                                                                 4
                                                                                    20
                                                                                        27
   163
                                                   2.5 2008
                                                                                    19
                                                                                        25
##
               subaru
                                                                4 manual(m5)
                                                                                4
                                  forester awd
##
   164
               subaru
                                  forester awd
                                                   2.5
                                                       2008
                                                                    auto(14)
                                                                                4
                                                                                    20
                                                                                        26
                                                   2.5 2008
##
   165
                                                                                4
                                                                                    18
                                                                                        23
              subaru
                                  forester awd
                                                                    auto(14)
##
   166
               subaru
                                   impreza awd
                                                   2.2 1999
                                                                    auto(14)
                                                                                4
                                                                                    21
                                                                                        26
##
  167
               subaru
                                                   2.2 1999
                                                                4 manual(m5)
                                                                                4
                                                                                    19
                                                                                        26
                                   impreza awd
##
   168
               subaru
                                                   2.5 1999
                                                                4 manual(m5)
                                                                                4
                                                                                    19
                                                                                        26
                                   impreza awd
               subaru
##
  169
                                                   2.5 1999
                                                                                4
                                                                                    19
                                                                                        26
                                   impreza awd
                                                                    auto(14)
   170
                                                   2.5 2008
                                                                                    20
                                                                                        25
               subaru
                                   impreza awd
                                                                    auto(s4)
                                                                                4
##
  171
              subaru
                                   impreza awd
                                                   2.5 2008
                                                                    auto(s4)
                                                                                4
                                                                                    20
                                                                                        27
##
   172
               subaru
                                   impreza awd
                                                   2.5
                                                       2008
                                                                4 manual(m5)
                                                                                4
                                                                                    19
                                                                                        25
                                                                                4
                                                                                    20
##
   173
               subaru
                                                   2.5 2008
                                                                4 manual(m5)
                                                                                        27
                                   impreza awd
## 174
               toyota
                                   4runner 4wd
                                                   2.7 1999
                                                                4 manual(m5)
                                                                                4
                                                                                    15
                                                                                        20
## 175
                                                   2.7 1999
                                                                                4
                                                                                    16
                                                                                        20
               toyota
                                   4runner 4wd
                                                                    auto(14)
##
  176
               toyota
                                   4runner 4wd
                                                   3.4 1999
                                                                6
                                                                    auto(14)
                                                                                4
                                                                                    15
                                                                                        19
## 177
               toyota
                                   4runner 4wd
                                                   3.4 1999
                                                                6 manual(m5)
                                                                                 4
                                                                                    15
                                                                                        17
##
  178
               toyota
                                   4runner 4wd
                                                   4.0 2008
                                                                    auto(15)
                                                                                4
                                                                                    16
                                                                                        20
##
   179
               toyota
                                   4runner 4wd
                                                   4.7
                                                       2008
                                                                    auto(15)
                                                                                4
                                                                                    14
                                                                                        17
##
   180
                                                                                f
                                                                                    21
                                                                                        29
                                                   2.2 1999
                                                                4 manual(m5)
               toyota
                                          camry
## 181
               toyota
                                          camry
                                                   2.2 1999
                                                                    auto(14)
                                                                                f
                                                                                    21
                                                                                        27
                                                                4 manual(m5)
## 182
               toyota
                                                   2.4 2008
                                                                                f
                                                                                    21
                                                                                        31
                                          camry
## 183
               toyota
                                                   2.4 2008
                                                                    auto(15)
                                                                                f
                                                                                    21
                                                                                        31
                                          camry
```

```
## 184
              tovota
                                                  3.0 1999
                                                               6
                                                                   auto(14)
                                                                               f
                                                                                   18
                                                                                       26
                                         camry
                                                  3.0 1999
## 185
                                                                               f
                                                                                   18
                                                                                       26
              toyota
                                                               6 manual(m5)
                                         camry
                                                                   auto(s6)
##
  186
              toyota
                                         camry
                                                  3.5 2008
                                                                               f
                                                                                   19
                                                                                       28
  187
                                                  2.2 1999
                                                                                   21
                                                                                       27
##
              toyota
                                 camry solara
                                                                   auto(14)
                                                                               f
##
   188
              toyota
                                 camry solara
                                                  2.2 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   21
                                                                                       29
## 189
                                                                               f
                                                                                   21
              toyota
                                 camry solara
                                                  2.4 2008
                                                               4 manual(m5)
                                                                                       31
## 190
              toyota
                                 camry solara
                                                  2.4 2008
                                                                   auto(s5)
                                                                               f
                                                                                   22
                                                                                       31
## 191
              toyota
                                 camry solara
                                                  3.0 1999
                                                               6
                                                                   auto(14)
                                                                               f
                                                                                   18
                                                                                       26
##
  192
              toyota
                                 camry solara
                                                  3.0 1999
                                                               6 manual(m5)
                                                                               f
                                                                                   18
                                                                                       26
## 193
                                                                                       27
              toyota
                                 camry solara
                                                  3.3 2008
                                                                   auto(s5)
                                                                               f
                                                                                   18
##
  194
                                       corolla
                                                  1.8 1999
                                                                   auto(13)
                                                                               f
                                                                                   24
                                                                                       30
              toyota
##
   195
                                                  1.8 1999
                                                                               f
                                                                                   24
                                                                                       33
              toyota
                                       corolla
                                                                   auto(14)
##
   196
                                                  1.8 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   26
                                                                                       35
              toyota
                                       corolla
                                                                                       37
## 197
              toyota
                                       corolla
                                                  1.8 2008
                                                               4 manual(m5)
                                                                               f
                                                                                   28
## 198
                                                                                   26
                                                                                       35
              toyota
                                       corolla
                                                  1.8 2008
                                                                   auto(14)
                                                                               f
## 199
              toyota land cruiser wagon 4wd
                                                  4.7 1999
                                                                   auto(14)
                                                                               4
                                                                                   11
                                                                                       15
## 200
                                                                                       18
              toyota land cruiser wagon 4wd
                                                  5.7 2008
                                                               8
                                                                   auto(s6)
                                                                               4
                                                                                   13
##
   201
                                                  2.7 1999
                                                               4 manual(m5)
                                                                                   15
                                                                                       20
              tovota
                            tovota tacoma 4wd
## 202
                                                  2.7 1999
                                                                                   16
                                                                                       20
                            toyota tacoma 4wd
                                                                   auto(14)
                                                                               4
              toyota
##
   203
              toyota
                            toyota tacoma 4wd
                                                  2.7 2008
                                                               4 manual(m5)
                                                                               4
                                                                                   17
                                                                                       22
##
  204
              toyota
                            toyota tacoma 4wd
                                                  3.4 1999
                                                               6 manual(m5)
                                                                               4
                                                                                   15
                                                                                       17
## 205
                                                  3.4 1999
                                                                   auto(14)
                                                                                   15
                                                                                       19
              toyota
                            toyota tacoma 4wd
                                                                               4
## 206
                                                  4.0 2008
                                                                                   15
                                                                                       18
              toyota
                            toyota tacoma 4wd
                                                               6 manual(m6)
                                                                               4
## 207
                                                  4.0 2008
                                                                                   16
                                                                                       20
              toyota
                            toyota tacoma 4wd
                                                                   auto(15)
                                                                               4
## 208
                                                                               f
                                                                                       29
          volkswagen
                                           gti
                                                  2.0 1999
                                                               4 manual(m5)
                                                                                   21
## 209
          volkswagen
                                           gti
                                                  2.0 1999
                                                                   auto(14)
                                                                               f
                                                                                   19
                                                                                       26
## 210
                                                  2.0 2008
                                                                               f
                                                                                   21
                                                                                       29
          volkswagen
                                           gti
                                                               4 manual(m6)
  211
                                                                                   22
##
          volkswagen
                                           gti
                                                  2.0 2008
                                                                   auto(s6)
                                                                               f
                                                                                       29
## 212
                                                                               f
                                                                                   17
                                                                                       24
          volkswagen
                                           gti
                                                  2.8 1999
                                                               6 manual(m5)
## 213
                                         jetta
                                                  1.9 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   33
                                                                                       44
          volkswagen
## 214
          volkswagen
                                         jetta
                                                  2.0 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   21
                                                                                       29
## 215
          volkswagen
                                                  2.0 1999
                                                                   auto(14)
                                                                               f
                                                                                   19
                                                                                       26
                                         jetta
## 216
          volkswagen
                                                  2.0 2008
                                                                   auto(s6)
                                                                               f
                                                                                   22
                                                                                       29
                                         jetta
## 217
                                                  2.0 2008
                                                                                   21
                                                                                       29
          volkswagen
                                                               4 manual(m6)
                                                                               f
                                         jetta
## 218
                                         ietta
                                                  2.5
                                                      2008
                                                                   auto(s6)
                                                                               f
                                                                                   21
                                                                                       29
          volkswagen
## 219
                                                  2.5 2008
                                                                                   21
                                                                                       29
          volkswagen
                                         jetta
                                                               5 manual(m5)
                                                                               f
## 220
          volkswagen
                                         jetta
                                                  2.8 1999
                                                                   auto(14)
                                                                               f
                                                                                   16
                                                                                       23
## 221
          volkswagen
                                                  2.8 1999
                                                               6 manual(m5)
                                                                               f
                                                                                   17
                                                                                       24
                                         jetta
## 222
                                    new beetle
                                                  1.9 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   35
                                                                                       44
          volkswagen
## 223
                                                  1.9 1999
                                                                               f
                                                                                   29
                                                                                       41
          volkswagen
                                    new beetle
                                                                   auto(14)
##
  224
                                                                                       29
          volkswagen
                                    new beetle
                                                  2.0 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   21
## 225
          volkswagen
                                                  2.0 1999
                                                                   auto(14)
                                                                               f
                                                                                   19
                                                                                       26
                                    new beetle
  226
##
          volkswagen
                                    new beetle
                                                  2.5 2008
                                                               5 manual(m5)
                                                                               f
                                                                                   20
                                                                                       28
                                                                                   20
##
  227
                                    new beetle
                                                  2.5 2008
                                                                   auto(s6)
                                                                               f
                                                                                       29
          volkswagen
## 228
          volkswagen
                                        passat
                                                  1.8 1999
                                                               4 manual(m5)
                                                                               f
                                                                                   21
                                                                                       29
## 229
                                                                                   18
                                                  1.8 1999
                                                                               f
                                                                                       29
          volkswagen
                                        passat
                                                                   auto(15)
## 230
          volkswagen
                                                  2.0 2008
                                                               4
                                                                   auto(s6)
                                                                               f
                                                                                   19
                                                                                       28
                                        passat
## 231
                                                                               f
                                                                                       29
          volkswagen
                                        passat
                                                  2.0 2008
                                                               4 manual(m6)
                                                                                   21
                                                                                   16
##
  232
          volkswagen
                                                  2.8 1999
                                                                   auto(15)
                                                                               f
                                                                                       26
                                        passat
   233
##
          volkswagen
                                                  2.8
                                                      1999
                                                               6 manual(m5)
                                                                               f
                                                                                   18
                                                                                       26
                                        passat
##
   234
                                                  3.6 2008
                                                                   auto(s6)
                                                                               f
                                                                                   17
                                                                                       26
          volkswagen
                                        passat
##
       fl
                class
## 1
              compact
         р
## 2
              compact
         р
```

```
## 3
              compact
        p
## 4
              compact
        p
## 5
        p
              compact
## 6
              compact
        p
## 7
        p
              compact
## 8
              compact
        p
## 9
              compact
        p
## 10
        p
              compact
## 11
        p
              compact
## 12
        p
              compact
## 13
        p
              compact
## 14
              compact
        p
## 15
        p
              compact
## 16
              midsize
        p
## 17
              midsize
        p
## 18
        p
              midsize
## 19
                  suv
        r
  20
##
        е
                  suv
## 21
                  suv
        r
## 22
        r
                  suv
## 23
        r
                  suv
## 24
        p
              2seater
## 25
              2seater
        р
## 26
              2seater
        p
## 27
              2seater
        p
## 28
        p
              2seater
##
  29
                  suv
        r
##
   30
                  suv
        е
## 31
                  suv
        r
## 32
        d
                  suv
## 33
        r
              midsize
##
   34
        r
              midsize
##
   35
              midsize
        r
##
  36
              midsize
        r
##
   37
              midsize
        r
## 38
              minivan
        r
## 39
        r
              minivan
## 40
        r
              minivan
## 41
        r
              minivan
## 42
              minivan
        r
## 43
        r
              minivan
## 44
              minivan
        е
## 45
              minivan
        r
## 46
              minivan
        r
## 47
              minivan
        r
## 48
        r
              minivan
               pickup
## 49
        r
## 50
        r
               pickup
## 51
        r
               pickup
## 52
               pickup
        r
## 53
               pickup
        r
## 54
               pickup
        r
## 55
        е
               pickup
## 56
        r
               pickup
```

```
## 57
               pickup
        r
## 58
        r
                  suv
## 59
        r
                  suv
## 60
                  suv
        е
  61
##
        r
                  suv
## 62
        r
                  suv
## 63
                  suv
        r
## 64
        r
                  suv
##
   65
        r
               pickup
##
  66
        е
               pickup
##
   67
        r
               pickup
##
   68
               pickup
        r
##
   69
        r
               pickup
## 70
        е
               pickup
## 71
        r
               pickup
## 72
        r
               pickup
## 73
        r
               pickup
##
  74
        r
               pickup
##
  75
        r
                  suv
##
  76
        r
                  suv
##
  77
        r
                  suv
## 78
        r
                  suv
## 79
        r
                  suv
## 80
        r
                  suv
## 81
        r
                  suv
##
  82
        r
                  suv
## 83
        r
                  suv
##
   84
        r
               pickup
## 85
        r
               pickup
## 86
        r
               pickup
## 87
        r
               pickup
##
  88
        r
               pickup
##
  89
               pickup
## 90
        r
               pickup
## 91
        r subcompact
## 92
        r subcompact
## 93
        r subcompact
## 94
        r subcompact
## 95
        r subcompact
## 96
        r subcompact
## 97
        r subcompact
## 98
        r subcompact
##
  99
        p subcompact
## 100
        r subcompact
## 101
        r subcompact
## 102
        r subcompact
## 103
        p subcompact
## 104
        r subcompact
## 105
        r subcompact
## 106
        r subcompact
## 107
        c subcompact
## 108
        p subcompact
## 109
        r
              midsize
## 110
       r
              midsize
```

```
## 111 r
             midsize
## 112
             midsize
       r
## 113
        r
             midsize
## 114
             midsize
        r
## 115
              midsize
        r
## 116
        r subcompact
## 117
        r subcompact
        r subcompact
## 118
## 119
        r subcompact
## 120
        r subcompact
## 121
        r subcompact
## 122
        r subcompact
## 123
        d
                  suv
## 124
        r
                  suv
## 125
        r
                  suv
## 126
        r
                  suv
## 127
        е
                  suv
## 128
        r
                  suv
## 129
        r
                  suv
## 130
        p
                  suv
## 131
        p
                  suv
## 132
        r
                  suv
## 133
        r
                  suv
## 134
        p
                  suv
## 135
                  suv
        r
## 136
        p
                  suv
## 137
        r
                  suv
## 138
        r
                  suv
## 139
        r
                  suv
## 140
        r
                  suv
## 141
        r
                  suv
## 142
        r
              compact
## 143
        r
              compact
## 144
        r
             midsize
## 145
        r
              midsize
## 146
             midsize
        p
## 147
        p
             midsize
## 148
        r
             midsize
## 149
             midsize
        r
## 150
             midsize
        р
## 151
        r
                  suv
## 152
        r
                  suv
## 153
        p
                  suv
## 154
                  suv
        p
## 155
        r
             midsize
## 156
             midsize
        р
## 157
             midsize
        r
## 158
        r
             midsize
             midsize
## 159
        p
## 160
        r
                  suv
## 161
        r
                  suv
## 162
        r
                  suv
## 163
        p
                  suv
## 164
                  suv
```

```
## 165
        p
                  suv
## 166
       r subcompact
## 167
        r subcompact
## 168
        r subcompact
## 169
        r subcompact
## 170
        р
              compact
## 171
        r
              compact
## 172
        р
              compact
## 173
        r
              compact
## 174
        r
                  suv
## 175
        r
                  suv
## 176
        r
                  suv
## 177
        r
                  suv
## 178
        r
                  suv
## 179
        r
                  suv
## 180
        r
             midsize
## 181
        r
             midsize
## 182
             midsize
## 183
        r
             midsize
## 184
             midsize
        r
## 185
        r
             midsize
## 186
        r
             midsize
## 187
        r
              compact
## 188
        r
              compact
## 189
        r
              compact
## 190
        r
              compact
## 191
        r
              compact
## 192
        r
              compact
## 193
        r
              compact
## 194
        r
              compact
## 195
        r
              compact
## 196
        r
              compact
## 197
              compact
## 198
        r
              compact
## 199
        r
                  suv
## 200
        r
                  suv
## 201
        r
              pickup
## 202
        r
              pickup
## 203
        r
               pickup
## 204
        r
               pickup
## 205
        r
              pickup
## 206
        r
               pickup
## 207
        r
               pickup
## 208
        r
              compact
## 209
        r
              compact
## 210
        р
              compact
## 211
        p
              compact
## 212
              compact
## 213
        d
              compact
## 214
        r
              compact
## 215
        r
              compact
## 216
              compact
        p
## 217
        p
              compact
## 218
              compact
        r
```

```
## 219 r
             compact
## 220
             compact
        r
## 221
             compact
## 222
        d subcompact
## 223
        d subcompact
## 224
        r subcompact
## 225
        r subcompact
## 226
        r subcompact
## 227
        r subcompact
## 228
        p
             midsize
## 229
             midsize
        p
## 230
        р
             midsize
## 231
             midsize
        p
## 232
        p
             midsize
## 233
             midsize
        p
## 234
             midsize
        р
```

1. How many columns are in mpg dataset? How about the number of rows? Show the codes and its result. answer - it has 11 columns and a rows of 234

## mpg\_data <- glimpse(mpg1)</pre>

```
## Rows: 234
## Columns: 11
## $ manufacturer <chr> "audi", "audi"
                                                         <chr> "a4", "a4", "a4", "a4", "a4", "a4", "a4", "a4 quattro", "~
## $ model
## $ displ
                                                         <dbl> 1.8, 1.8, 2.0, 2.0, 2.8, 2.8, 3.1, 1.8, 1.8, 2.0, 2.0, 2.~
## $ year
                                                        <int> 1999, 1999, 2008, 2008, 1999, 1999, 2008, 1999, 1999, 200~
## $ cyl
                                                         <int> 4, 4, 4, 4, 6, 6, 6, 4, 4, 4, 6, 6, 6, 6, 6, 6, 8, 8, ~
## $ trans
                                                         <chr> "auto(15)", "manual(m5)", "manual(m6)", "auto(av)", "auto~
                                                         ## $ drv
                                                        <int> 18, 21, 20, 21, 16, 18, 18, 18, 16, 20, 19, 15, 17, 17, 1~
## $ cty
                                                         <int> 29, 29, 31, 30, 26, 26, 27, 26, 25, 28, 27, 25, 25, 25, 2~
## $ hwy
                                                         ## $ fl
## $ class
                                                         <chr> "compact", "compact", "compact", "compact", "compact", "c~
mpg_data
```

```
trans drv cty hwy
       manufacturer
                                        model displ year cyl
## 1
                                                 1.8 1999
                                                                  auto(15)
                                                                                      29
                audi
                                            a4
                                                              4
                                                                              f
                                                                                 18
## 2
                audi
                                            a4
                                                 1.8 1999
                                                              4 manual(m5)
                                                                              f
                                                                                 21
                                                                                      29
## 3
                                                 2.0 2008
                                                                                 20
                                                                                      31
                audi
                                            a4
                                                              4 manual(m6)
                                                                              f
## 4
                                                 2.0 2008
                                                                                 21
                                                                                      30
                audi
                                            а4
                                                                  auto(av)
                                                                              f
## 5
                audi
                                            a4
                                                 2.8 1999
                                                                  auto(15)
                                                                              f
                                                                                 16
                                                                                      26
## 6
                audi
                                            a4
                                                 2.8 1999
                                                              6 manual(m5)
                                                                              f
                                                                                 18
                                                                                      26
## 7
                audi
                                                 3.1 2008
                                                                  auto(av)
                                                                              f
                                                                                 18
                                                                                      27
                                                 1.8 1999
## 8
                                   a4 quattro
                                                              4 manual(m5)
                                                                              4
                                                                                 18
                                                                                      26
                audi
## 9
                audi
                                   a4 quattro
                                                 1.8 1999
                                                                  auto(15)
                                                                              4
                                                                                 16
                                                                                      25
## 10
                audi
                                   a4 quattro
                                                 2.0 2008
                                                              4 manual(m6)
                                                                              4
                                                                                 20
                                                                                      28
## 11
                                   a4 quattro
                                                 2.0 2008
                                                                                 19
                                                                                      27
                audi
                                                                  auto(s6)
                                                                              4
## 12
                                   a4 quattro
                                                 2.8 1999
                                                                  auto(15)
                                                                              4
                                                                                 15
                                                                                      25
                audi
                                                              6
## 13
                                                                                 17
                                                                                      25
                audi
                                   a4 quattro
                                                 2.8 1999
                                                              6 manual(m5)
                                                                              4
                                                                              4
                                                                                 17
## 14
                                   a4 quattro
                                                 3.1 2008
                                                                  auto(s6)
                                                                                      25
                audi
## 15
                audi
                                   a4 quattro
                                                 3.1 2008
                                                              6 manual(m6)
                                                                              4
                                                                                 15
                                                                                      25
## 16
                                   a6 quattro
                                                 2.8 1999
                                                                              4 15
                audi
                                                                  auto(15)
                                                                                      24
```

```
## 17
                 audi
                                    a6 quattro
                                                   3.1 2008
                                                                    auto(s6)
                                                                                 4
                                                                                    17
                                                                                         25
                                                                6
##
  18
                                                   4.2 2008
                                                                                 4
                                                                                    16
                                                                                         23
                 audi
                                    a6 quattro
                                                                8
                                                                    auto(s6)
##
   19
           chevrolet
                           c1500 suburban 2wd
                                                   5.3 2008
                                                                    auto(14)
                                                                                 r
                                                                                    14
                                                                                         20
                                                                                    11
##
  20
                           c1500 suburban 2wd
                                                   5.3 2008
                                                                                         15
           chevrolet
                                                                8
                                                                    auto(14)
                                                                                 r
##
   21
           chevrolet
                           c1500 suburban 2wd
                                                   5.3 2008
                                                                8
                                                                    auto(14)
                                                                                 r
                                                                                    14
                                                                                         20
##
  22
                           c1500 suburban 2wd
                                                                                    13
           chevrolet
                                                   5.7 1999
                                                                8
                                                                    auto(14)
                                                                                         17
                                                                                 r
##
  23
           chevrolet
                           c1500 suburban 2wd
                                                   6.0 2008
                                                                8
                                                                    auto(14)
                                                                                 r
                                                                                    12
                                                                                         17
## 24
           chevrolet
                                       corvette
                                                   5.7 1999
                                                                8 manual(m6)
                                                                                 r
                                                                                    16
                                                                                         26
##
   25
           chevrolet
                                                   5.7 1999
                                                                8
                                                                    auto(14)
                                                                                 r
                                                                                    15
                                                                                         23
                                      corvette
##
   26
           chevrolet
                                       corvette
                                                   6.2 2008
                                                                  manual(m6)
                                                                                 r
                                                                                    16
                                                                                         26
##
   27
           chevrolet
                                                   6.2 2008
                                                                    auto(s6)
                                                                                    15
                                                                                         25
                                       corvette
                                                                                 r
##
   28
                                                   7.0 2008
                                                                                    15
                                                                                         24
           chevrolet
                                       corvette
                                                                8
                                                                  manual(m6)
                                                                                 r
                              k1500 tahoe 4wd
##
   29
           chevrolet
                                                   5.3 2008
                                                                    auto(14)
                                                                                 4
                                                                                    14
                                                                                         19
                                                                8
##
   30
                              k1500 tahoe 4wd
                                                                    auto(14)
           chevrolet
                                                   5.3 2008
                                                                                 4
                                                                                    11
                                                                                         14
##
   31
                              k1500 tahoe 4wd
                                                                                 4
                                                                                         15
           chevrolet
                                                   5.7 1999
                                                                8
                                                                    auto(14)
                                                                                    11
##
   32
           chevrolet
                              k1500 tahoe 4wd
                                                   6.5 1999
                                                                8
                                                                    auto(14)
                                                                                 4
                                                                                    14
                                                                                         17
##
   33
                                         malibu
                                                                                 f
                                                                                    19
                                                                                         27
           chevrolet
                                                   2.4 1999
                                                                4
                                                                    auto(14)
##
   34
           chevrolet
                                         malibu
                                                   2.4 2008
                                                                                 f
                                                                                    22
                                                                                         30
                                                                    auto(14)
##
   35
                                         malibu
                                                   3.1 1999
                                                                                    18
                                                                                         26
           chevrolet
                                                                    auto(14)
                                                                                 f
                                                                6
##
   36
           chevrolet
                                         malibu
                                                   3.5 2008
                                                                6
                                                                    auto(14)
                                                                                 f
                                                                                    18
                                                                                         29
##
   37
           chevrolet
                                         malibu
                                                   3.6 2008
                                                                6
                                                                    auto(s6)
                                                                                 f
                                                                                    17
                                                                                         26
##
   38
                                                   2.4 1999
                                                                                 f
                                                                                    18
                dodge
                                   caravan 2wd
                                                                    auto(13)
                                                                                         24
## 39
                                                   3.0 1999
                                                                                 f
                                                                                    17
                dodge
                                   caravan 2wd
                                                                6
                                                                    auto(14)
                                                                                         24
##
   40
                                                   3.3 1999
                                                                                 f
                                                                                    16
                                                                                         22
                dodge
                                   caravan 2wd
                                                                6
                                                                    auto(14)
##
   41
                                                   3.3 1999
                                                                                 f
                                                                                         22
                dodge
                                   caravan 2wd
                                                                6
                                                                    auto(14)
                                                                                    16
                dodge
   42
                                   caravan 2wd
                                                   3.3 2008
                                                                6
                                                                    auto(14)
                                                                                 f
                                                                                    17
                                                                                         24
##
   43
                                                   3.3 2008
                                                                                 f
                                                                                    17
                                                                                         24
                dodge
                                   caravan 2wd
                                                                6
                                                                    auto(14)
##
   44
                dodge
                                   caravan 2wd
                                                   3.3 2008
                                                                6
                                                                    auto(14)
                                                                                 f
                                                                                    11
                                                                                         17
                                                   3.8 1999
##
   45
                                                                                 f
                                                                                    15
                                                                                         22
                dodge
                                   caravan 2wd
                                                                6
                                                                    auto(14)
##
   46
                                                   3.8 1999
                                                                6
                                                                    auto(14)
                                                                                 f
                                                                                    15
                                                                                         21
                dodge
                                   caravan 2wd
## 47
                dodge
                                   caravan 2wd
                                                   3.8 2008
                                                                6
                                                                    auto(16)
                                                                                 f
                                                                                    16
                                                                                         23
##
   48
                dodge
                                   caravan 2wd
                                                   4.0 2008
                                                                6
                                                                    auto(16)
                                                                                 f
                                                                                    16
                                                                                         23
##
   49
                dodge
                            dakota pickup 4wd
                                                   3.7 2008
                                                                6 manual(m6)
                                                                                 4
                                                                                    15
                                                                                         19
##
   50
                                                                                         18
                            dakota pickup 4wd
                                                   3.7 2008
                                                                    auto(14)
                                                                                 4
                                                                                    14
                dodge
##
   51
                            dakota pickup 4wd
                                                   3.9
                                                        1999
                                                                                 4
                                                                                    13
                                                                                         17
                dodge
                                                                     auto(14)
##
   52
                                                   3.9 1999
                                                                                 4
                                                                                    14
                                                                                         17
                dodge
                            dakota pickup 4wd
                                                                6 manual(m5)
##
  53
                dodge
                            dakota pickup 4wd
                                                   4.7 2008
                                                                    auto(15)
                                                                                 4
                                                                                    14
                                                                                         19
##
  54
                            dakota pickup 4wd
                                                   4.7 2008
                                                                8
                                                                    auto(15)
                                                                                 4
                                                                                    14
                                                                                         19
                dodge
##
   55
                            dakota pickup 4wd
                                                   4.7 2008
                                                                    auto(15)
                                                                                 4
                                                                                     9
                                                                                         12
                dodge
                                                                8
                                                                                    11
##
   56
                                                   5.2 1999
                                                                                 4
                                                                                         17
                dodge
                            dakota pickup 4wd
                                                                8 manual(m5)
   57
                                                                                         15
                dodge
                            dakota pickup 4wd
                                                   5.2 1999
                                                                8
                                                                    auto(14)
                                                                                 4
                                                                                    11
##
   58
                                   durango 4wd
                                                   3.9 1999
                                                                                 4
                                                                                    13
                                                                                         17
                dodge
                                                                6
                                                                    auto(14)
                dodge
##
   59
                                   durango 4wd
                                                   4.7
                                                       2008
                                                                8
                                                                    auto(15)
                                                                                 4
                                                                                    13
                                                                                         17
                                                                                 4
##
   60
                                                   4.7
                                                       2008
                                                                8
                                                                                     9
                                                                                         12
                dodge
                                   durango 4wd
                                                                    auto(15)
                                                                                    13
##
   61
                dodge
                                   durango 4wd
                                                   4.7 2008
                                                                8
                                                                    auto(15)
                                                                                 4
                                                                                         17
## 62
                                                                                         16
                                                   5.2 1999
                                                                                 4
                                                                                    11
                dodge
                                   durango 4wd
                                                                8
                                                                    auto(14)
##
   63
                dodge
                                   durango 4wd
                                                   5.7
                                                       2008
                                                                8
                                                                    auto(15)
                                                                                 4
                                                                                    13
                                                                                         18
                                                                                         15
##
   64
                dodge
                                   durango 4wd
                                                   5.9 1999
                                                                    auto(14)
                                                                                 4
                                                                                    11
                          ram 1500 pickup 4wd
##
   65
                                                   4.7 2008
                                                                8 manual(m6)
                                                                                 4
                                                                                    12
                                                                                         16
                dodge
##
   66
                          ram 1500 pickup 4wd
                                                   4.7
                                                        2008
                                                                    auto(15)
                                                                                 4
                                                                                     9
                                                                                         12
                dodge
##
   67
                                                                                 4
                                                                                    13
                                                                                         17
                          ram 1500 pickup 4wd
                                                   4.7
                                                        2008
                                                                8
                dodge
                                                                    auto(15)
                                                                                 4
##
   68
                dodge
                          ram 1500 pickup 4wd
                                                   4.7 2008
                                                                    auto(15)
                                                                                    13
                                                                                         17
## 69
                dodge
                          ram 1500 pickup 4wd
                                                   4.7 2008
                                                                8 manual(m6)
                                                                                 4
                                                                                    12
                                                                                         16
## 70
                dodge
                          ram 1500 pickup 4wd
                                                   4.7 2008
                                                                8 manual(m6)
                                                                                 4
                                                                                      9
                                                                                         12
```

```
## 71
                dodge
                          ram 1500 pickup 4wd
                                                   5.2 1999
                                                                    auto(14)
                                                                                 4
                                                                                    11
                                                                                         15
##
   72
                                                   5.2 1999
                                                                                 4
                                                                                     11
                                                                                         16
                dodge
                          ram 1500 pickup 4wd
                                                                8 manual(m5)
##
   73
                dodge
                          ram 1500 pickup 4wd
                                                   5.7 2008
                                                                    auto(15)
                                                                                 4
                                                                                     13
                                                                                         17
##
   74
                          ram 1500 pickup 4wd
                                                   5.9 1999
                                                                    auto(14)
                                                                                    11
                                                                                         15
                dodge
                                                                8
                                                                                 4
##
   75
                 ford
                                expedition 2wd
                                                   4.6 1999
                                                                8
                                                                    auto(14)
                                                                                 r
                                                                                     11
                                                                                         17
   76
                                                   5.4 1999
                                                                                    11
##
                 ford
                                expedition 2wd
                                                                8
                                                                    auto(14)
                                                                                         17
                                                                                 r
                                                   5.4 2008
##
   77
                 ford
                                expedition 2wd
                                                                    auto(16)
                                                                                 r
                                                                                    12
                                                                                         18
                                                   4.0 1999
##
  78
                 ford
                                  explorer 4wd
                                                                6
                                                                    auto(15)
                                                                                 4
                                                                                    14
                                                                                         17
##
   79
                 ford
                                  explorer 4wd
                                                   4.0 1999
                                                                6 manual(m5)
                                                                                 4
                                                                                    15
                                                                                         19
   80
                                                   4.0 1999
##
                 ford
                                  explorer 4wd
                                                                    auto(15)
                                                                                 4
                                                                                    14
                                                                                         17
##
   81
                 ford
                                  explorer 4wd
                                                   4.0 2008
                                                                    auto(15)
                                                                                 4
                                                                                    13
                                                                                         19
##
   82
                                                   4.6 2008
                                                                                    13
                                                                                         19
                 ford
                                  explorer 4wd
                                                                8
                                                                    auto(16)
                                                                                 4
##
   83
                 ford
                                  explorer 4wd
                                                   5.0 1999
                                                                8
                                                                    auto(14)
                                                                                 4
                                                                                     13
                                                                                         17
##
   84
                 ford
                               f150 pickup 4wd
                                                   4.2 1999
                                                                    auto(14)
                                                                                 4
                                                                                     14
                                                                                         17
##
   85
                              f150 pickup 4wd
                                                   4.2 1999
                                                                6 manual(m5)
                                                                                 4
                                                                                    14
                                                                                         17
                 ford
##
   86
                 ford
                              f150 pickup 4wd
                                                   4.6 1999
                                                                  manual(m5)
                                                                                 4
                                                                                     13
                                                                                         16
##
                                                                                 4
   87
                              f150 pickup 4wd
                                                   4.6 1999
                                                                8
                                                                    auto(14)
                                                                                    13
                                                                                         16
                 ford
##
   88
                              f150 pickup 4wd
                                                   4.6 2008
                                                                    auto(14)
                                                                                     13
                                                                                         17
                 ford
##
   89
                                                   5.4 1999
                                                                                         15
                 ford
                              f150 pickup 4wd
                                                                    auto(14)
                                                                                 4
                                                                                    11
                                                                8
##
   90
                 ford
                              f150 pickup 4wd
                                                   5.4 2008
                                                                    auto(14)
                                                                                 4
                                                                                     13
                                                                                         17
##
   91
                 ford
                                        mustang
                                                   3.8 1999
                                                                6 manual(m5)
                                                                                 r
                                                                                     18
                                                                                         26
##
   92
                 ford
                                                   3.8 1999
                                                                    auto(14)
                                                                                     18
                                                                                         25
                                        mustang
                                                                                 r
##
  93
                                                   4.0 2008
                                                                6 manual(m5)
                 ford
                                        mustang
                                                                                    17
                                                                                         26
                                                                                 r
##
   94
                                                   4.0 2008
                 ford
                                        mustang
                                                                    auto(15)
                                                                                 r
                                                                                    16
                                                                                         24
##
   95
                 ford
                                        mustang
                                                   4.6 1999
                                                                    auto(14)
                                                                                 r
                                                                                     15
                                                                                         21
   96
                 ford
                                        mustang
                                                   4.6 1999
                                                                8 manual(m5)
                                                                                 r
                                                                                     15
                                                                                         22
##
   97
                                                   4.6
                                                       2008
                                                                8 manual(m5)
                                                                                     15
                                                                                         23
                 ford
                                        mustang
                                                                                 r
   98
##
                 ford
                                        mustang
                                                   4.6 2008
                                                                    auto(15)
                                                                                     15
                                                                                         22
                                                                                 r
##
   99
                                                   5.4 2008
                                                                                     14
                                                                                         20
                 ford
                                        mustang
                                                                8 manual(m6)
                                                                                 r
##
   100
                honda
                                                   1.6 1999
                                                                4 manual(m5)
                                                                                 f
                                                                                     28
                                                                                         33
                                          civic
##
   101
                honda
                                          civic
                                                   1.6 1999
                                                                    auto(14)
                                                                                 f
                                                                                     24
                                                                                         32
##
   102
                honda
                                                   1.6 1999
                                                                4 manual(m5)
                                                                                 f
                                                                                     25
                                                                                         32
                                          civic
                                                                                         29
##
   103
                honda
                                                   1.6 1999
                                                                4 manual(m5)
                                                                                 f
                                                                                     23
                                          civic
   104
                                                                                     24
                                                                                         32
##
                honda
                                                   1.6 1999
                                                                    auto(14)
                                                                                 f
                                          civic
##
   105
                honda
                                                   1.8
                                                       2008
                                                                  manual(m5)
                                                                                 f
                                                                                     26
                                                                                         34
                                          civic
                                                   1.8 2008
##
   106
                                                                                 f
                                                                                     25
                                                                                         36
                honda
                                          civic
                                                                    auto(15)
##
  107
               honda
                                          civic
                                                   1.8 2008
                                                                    auto(15)
                                                                                 f
                                                                                     24
                                                                                         36
## 108
               honda
                                                   2.0 2008
                                                                4 manual(m6)
                                                                                 f
                                                                                    21
                                                                                         29
                                          civic
## 109
             hyundai
                                                   2.4 1999
                                                                    auto(14)
                                                                                 f
                                                                                     18
                                                                                         26
                                         sonata
## 110
                                                   2.4 1999
                                                                4 manual(m5)
                                                                                 f
                                                                                     18
                                                                                         27
             hyundai
                                         sonata
## 111
                                                   2.4 2008
                                                                                         30
             hyundai
                                         sonata
                                                                    auto(14)
                                                                                 f
                                                                                     21
## 112
             hyundai
                                                   2.4 2008
                                                                4 manual(m5)
                                                                                 f
                                                                                    21
                                                                                         31
                                         sonata
##
  113
             hyundai
                                         sonata
                                                   2.5 1999
                                                                    auto(14)
                                                                                 f
                                                                                     18
                                                                                         26
                                                   2.5 1999
## 114
             hyundai
                                                                6 manual(m5)
                                                                                 f
                                                                                     18
                                                                                         26
                                         sonata
## 115
             hyundai
                                         sonata
                                                   3.3 2008
                                                                    auto(15)
                                                                                 f
                                                                                     19
                                                                                         28
## 116
                                                   2.0 1999
                                                                    auto(14)
                                                                                 f
                                                                                    19
                                                                                         26
             hyundai
                                        tiburon
## 117
             hyundai
                                        tiburon
                                                   2.0 1999
                                                                4 manual(m5)
                                                                                 f
                                                                                     19
                                                                                         29
                                                                                 f
                                                                                         28
## 118
             hyundai
                                        tiburon
                                                   2.0 2008
                                                                4 manual(m5)
                                                                                     20
## 119
             hyundai
                                        tiburon
                                                   2.0 2008
                                                                    auto(14)
                                                                                 f
                                                                                    20
                                                                                         27
##
  120
             hyundai
                                        tiburon
                                                   2.7
                                                       2008
                                                                    auto(14)
                                                                                 f
                                                                                     17
                                                                                         24
## 121
                                                        2008
                                                                                 f
                                                                                     16
                                                                                         24
             hyundai
                                                   2.7
                                                                6 manual(m6)
                                        tiburon
## 122
             hyundai
                                        tiburon
                                                   2.7 2008
                                                                6 manual(m5)
                                                                                 f
                                                                                     17
                                                                                         24
## 123
                           grand cherokee 4wd
                                                   3.0 2008
                                                                6
                                                                    auto(15)
                                                                                 4
                                                                                    17
                                                                                         22
                 jeep
## 124
                           grand cherokee 4wd
                                                   3.7 2008
                                                                    auto(15)
                                                                                 4
                                                                                     15
                                                                                         19
                 jeep
```

```
## 125
                           grand cherokee 4wd
                                                   4.0 1999
                                                                    auto(14)
                                                                                4
                                                                                    15
                                                                                        20
                 ieep
                                                                6
## 126
                                                                                4
                                                                                    14
                                                                                        17
                           grand cherokee 4wd
                                                   4.7 1999
                                                               8
                                                                    auto(14)
                 jeep
## 127
                 jeep
                           grand cherokee 4wd
                                                   4.7 2008
                                                                    auto(15)
                                                                                4
                                                                                     9
                                                                                         12
                                                                                        19
##
  128
                           grand cherokee 4wd
                                                   4.7 2008
                                                                    auto(15)
                                                                                4
                                                                                    14
                 jeep
                                                               8
##
   129
                 jeep
                           grand cherokee 4wd
                                                   5.7 2008
                                                               8
                                                                    auto(15)
                                                                                4
                                                                                    13
                                                                                        18
##
  130
                                                                                4
                                                                                    11
                           grand cherokee 4wd
                                                   6.1 2008
                                                               8
                                                                    auto(15)
                                                                                        14
                 jeep
## 131
          land rover
                                   range rover
                                                   4.0 1999
                                                                8
                                                                    auto(14)
                                                                                4
                                                                                    11
                                                                                        15
                                                                                    12
## 132
          land rover
                                   range rover
                                                   4.2 2008
                                                               8
                                                                    auto(s6)
                                                                                4
                                                                                        18
##
   133
          land rover
                                   range rover
                                                   4.4 2008
                                                               8
                                                                    auto(s6)
                                                                                4
                                                                                    12
                                                                                        18
##
                                                                                        15
   134
          land rover
                                   range rover
                                                   4.6 1999
                                                                8
                                                                    auto(14)
                                                                                 4
                                                                                    11
   135
             lincoln
                                 navigator 2wd
                                                   5.4 1999
                                                                8
                                                                    auto(14)
                                                                                    11
                                                                                        17
                                                                                r
   136
                                                   5.4 1999
                                                                                        16
##
             lincoln
                                 navigator 2wd
                                                                8
                                                                    auto(14)
                                                                                r
                                                                                    11
##
   137
             lincoln
                                                   5.4 2008
                                                               8
                                                                    auto(16)
                                                                                    12
                                                                                        18
                                 navigator 2wd
                                                                                r
##
   138
             mercury
                              mountaineer 4wd
                                                   4.0 1999
                                                                    auto(15)
                                                                                4
                                                                                    14
                                                                                        17
## 139
                                                   4.0 2008
                                                                                4
                                                                                    13
                                                                                        19
             mercury
                              mountaineer 4wd
                                                                6
                                                                    auto(15)
## 140
                              mountaineer 4wd
                                                   4.6 2008
                                                               8
                                                                    auto(16)
                                                                                4
                                                                                    13
                                                                                        19
             mercury
                                                   5.0 1999
                                                                                4
                                                                                        17
## 141
                                                                8
                                                                    auto(14)
                                                                                    13
             mercury
                              mountaineer 4wd
##
   142
                                                   2.4 1999
                                                                4 manual(m5)
                                                                                f
                                                                                    21
                                                                                        29
              nissan
                                         altima
##
  143
                                                   2.4 1999
                                                                                    19
                                                                                        27
              nissan
                                         altima
                                                                    auto(14)
                                                                                f
##
   144
              nissan
                                         altima
                                                   2.5 2008
                                                                    auto(av)
                                                                                f
                                                                                    23
                                                                                        31
##
   145
              nissan
                                         altima
                                                   2.5 2008
                                                                4 manual(m6)
                                                                                f
                                                                                    23
                                                                                        32
##
   146
                                                   3.5 2008
                                                                6 manual(m6)
                                                                                f
                                                                                    19
                                                                                        27
              nissan
                                         altima
## 147
                                                   3.5 2008
                                                                                f
                                                                                    19
                                                                                        26
              nissan
                                         altima
                                                                6
                                                                    auto(av)
   148
                                                   3.0 1999
                                                                    auto(14)
                                                                                f
                                                                                    18
                                                                                         26
##
              nissan
                                         maxima
                                                                6
                                                   3.0 1999
##
                                                                                        25
  149
              nissan
                                         maxima
                                                                6 manual(m5)
                                                                                f
                                                                                    19
   150
              nissan
                                        maxima
                                                   3.5 2008
                                                                    auto(av)
                                                                                f
                                                                                    19
                                                                                        25
##
   151
                                                   3.3 1999
                                                                                    14
                                                                                        17
              nissan
                                pathfinder 4wd
                                                                    auto(14)
                                                                                4
##
   152
              nissan
                                pathfinder 4wd
                                                   3.3 1999
                                                                6 manual(m5)
                                                                                4
                                                                                    15
                                                                                        17
##
   153
                                                   4.0 2008
                                                                                4
                                                                                    14
                                                                                        20
              nissan
                                pathfinder 4wd
                                                                    auto(15)
##
  154
                                pathfinder 4wd
                                                   5.6 2008
                                                                8
                                                                    auto(s5)
                                                                                4
                                                                                    12
                                                                                        18
              nissan
##
   155
             pontiac
                                    grand prix
                                                   3.1 1999
                                                                6
                                                                    auto(14)
                                                                                f
                                                                                    18
                                                                                        26
##
   156
                                    grand prix
                                                   3.8 1999
                                                                6
                                                                    auto(14)
                                                                                f
                                                                                    16
                                                                                        26
             pontiac
##
   157
                                    grand prix
                                                   3.8 1999
                                                                    auto(14)
                                                                                f
                                                                                    17
                                                                                        27
             pontiac
                                                                                    18
                                                   3.8 2008
                                                                                        28
##
   158
                                    grand prix
                                                                    auto(14)
                                                                                f
             pontiac
##
   159
             pontiac
                                    grand prix
                                                   5.3
                                                       2008
                                                                    auto(s4)
                                                                                f
                                                                                    16
                                                                                        25
                                                   2.5 1999
##
   160
                                  forester awd
                                                                                4
                                                                                    18
                                                                                        25
              subaru
                                                                4 manual(m5)
##
   161
               subaru
                                  forester awd
                                                   2.5 1999
                                                                    auto(14)
                                                                                4
                                                                                    18
                                                                                        24
##
  162
               subaru
                                  forester awd
                                                   2.5 2008
                                                                4 manual(m5)
                                                                                4
                                                                                    20
                                                                                        27
##
   163
               subaru
                                                   2.5 2008
                                                                4 manual(m5)
                                                                                4
                                                                                    19
                                                                                        25
                                  forester awd
##
   164
                                                   2.5 2008
                                                                                 4
                                                                                    20
                                                                                        26
               subaru
                                  forester awd
                                                                    auto(14)
   165
                                                   2.5 2008
                                                                                        23
               subaru
                                  forester awd
                                                                    auto(14)
                                                                                4
                                                                                    18
##
   166
              subaru
                                                   2.2 1999
                                                                    auto(14)
                                                                                4
                                                                                    21
                                                                                        26
                                   impreza awd
##
   167
               subaru
                                   impreza awd
                                                   2.2
                                                       1999
                                                                4 manual(m5)
                                                                                4
                                                                                    19
                                                                                        26
                                                   2.5 1999
                                                                                4
                                                                                    19
##
   168
               subaru
                                                                 manual(m5)
                                                                                        26
                                   impreza awd
## 169
               subaru
                                                   2.5 1999
                                                                    auto(14)
                                                                                4
                                                                                    19
                                                                                        26
                                   impreza awd
                                                                                    20
## 170
                                                   2.5 2008
                                                                                4
                                                                                        25
              subaru
                                   impreza awd
                                                                4
                                                                    auto(s4)
##
   171
               subaru
                                   impreza awd
                                                   2.5 2008
                                                                    auto(s4)
                                                                                4
                                                                                    20
                                                                                        27
##
  172
                                                                                        25
               subaru
                                   impreza awd
                                                   2.5 2008
                                                                4 manual(m5)
                                                                                 4
                                                                                    19
##
   173
              subaru
                                                   2.5 2008
                                                                4 manual(m5)
                                                                                4
                                                                                    20
                                                                                        27
                                   impreza awd
##
   174
               toyota
                                   4runner 4wd
                                                   2.7
                                                       1999
                                                                4 manual(m5)
                                                                                4
                                                                                    15
                                                                                        20
##
   175
                                                                                4
                                                                                    16
                                                                                        20
                                   4runner 4wd
                                                   2.7 1999
                                                                    auto(14)
               toyota
                                                                                4
## 176
               toyota
                                   4runner 4wd
                                                   3.4 1999
                                                                    auto(14)
                                                                                    15
                                                                                        19
## 177
                                                                                    15
               toyota
                                   4runner 4wd
                                                   3.4 1999
                                                                6 manual(m5)
                                                                                4
                                                                                        17
## 178
               toyota
                                   4runner 4wd
                                                   4.0 2008
                                                                    auto(15)
                                                                                 4
                                                                                    16
                                                                                        20
```

```
## 179
              tovota
                                   4runner 4wd
                                                   4.7 2008
                                                                   auto(15)
                                                                                4
                                                                                   14
                                                                                        17
## 180
                                                                                f
                                                                                   21
                                                                                        29
              toyota
                                                  2.2 1999
                                                               4 manual(m5)
                                         camry
                                                                   auto(14)
##
  181
              toyota
                                         camry
                                                  2.2 1999
                                                                                f
                                                                                   21
                                                                                        27
##
  182
                                                  2.4 2008
                                                               4 manual(m5)
                                                                                   21
                                                                                        31
              toyota
                                         camry
                                                                                f
##
   183
              toyota
                                         camry
                                                  2.4 2008
                                                                   auto(15)
                                                                                f
                                                                                   21
                                                                                        31
                                                                                f
                                                                                   18
                                                                                        26
## 184
              toyota
                                                  3.0 1999
                                                                   auto(14)
                                         camry
## 185
              toyota
                                         camry
                                                   3.0 1999
                                                               6 manual(m5)
                                                                                f
                                                                                   18
                                                                                        26
## 186
              toyota
                                         camry
                                                   3.5 2008
                                                               6
                                                                   auto(s6)
                                                                                f
                                                                                   19
                                                                                        28
## 187
              toyota
                                  camry solara
                                                   2.2 1999
                                                                   auto(14)
                                                                                f
                                                                                   21
                                                                                        27
                                                                                        29
## 188
              toyota
                                  camry solara
                                                  2.2 1999
                                                               4 manual(m5)
                                                                                f
                                                                                   21
##
  189
                                                   2.4 2008
                                                               4 manual(m5)
                                                                                f
                                                                                   21
                                                                                        31
              toyota
                                 camry solara
   190
                                                  2.4 2008
                                                                                f
                                                                                   22
                                                                                        31
##
              toyota
                                  camry solara
                                                                   auto(s5)
##
   191
                                                  3.0 1999
                                                                   auto(14)
                                                                                f
                                                                                   18
                                                                                        26
              toyota
                                  camry solara
## 192
              toyota
                                  camry solara
                                                  3.0 1999
                                                               6 manual(m5)
                                                                                f
                                                                                   18
                                                                                        26
## 193
                                                                                   18
                                                                                        27
              toyota
                                 camry solara
                                                  3.3 2008
                                                                   auto(s5)
                                                                                f
## 194
                                       corolla
                                                   1.8 1999
                                                                   auto(13)
                                                                                f
                                                                                   24
                                                                                        30
              toyota
## 195
                                                                                f
                                                                                        33
                                       corolla
                                                   1.8 1999
                                                                   auto(14)
                                                                                   24
              toyota
##
   196
                                       corolla
                                                   1.8 1999
                                                               4 manual(m5)
                                                                                f
                                                                                   26
                                                                                        35
              toyota
  197
                                                   1.8 2008
                                                                                   28
                                                                                        37
##
              toyota
                                       corolla
                                                               4 manual(m5)
                                                                                f
##
   198
              toyota
                                       corolla
                                                   1.8 2008
                                                                   auto(14)
                                                                                f
                                                                                   26
                                                                                        35
##
  199
              toyota land cruiser wagon 4wd
                                                  4.7 1999
                                                                   auto(14)
                                                                                4
                                                                                   11
                                                                                        15
## 200
              toyota land cruiser wagon 4wd
                                                  5.7 2008
                                                                   auto(s6)
                                                                                   13
                                                                                        18
                                                                                4
## 201
                                                                                        20
              toyota
                            toyota tacoma 4wd
                                                  2.7 1999
                                                               4 manual(m5)
                                                                                4
                                                                                   15
##
  202
                                                   2.7 1999
                                                                                   16
                                                                                        20
              toyota
                            toyota tacoma 4wd
                                                                   auto(14)
                                                                                4
## 203
                                                                                        22
              toyota
                            toyota tacoma 4wd
                                                   2.7 2008
                                                               4 manual(m5)
                                                                                4
                                                                                   17
  204
              toyota
                            toyota tacoma 4wd
                                                   3.4 1999
                                                               6 manual(m5)
                                                                                4
                                                                                   15
                                                                                        17
##
  205
                                                  3.4 1999
                                                                                   15
                                                                                        19
              toyota
                            toyota tacoma 4wd
                                                                   auto(14)
                                                                                4
##
   206
              toyota
                            toyota tacoma 4wd
                                                  4.0 2008
                                                               6 manual(m6)
                                                                                4
                                                                                   15
                                                                                        18
                                                  4.0 2008
                                                                                   16
##
   207
                                                                                4
                                                                                        20
              toyota
                            toyota tacoma 4wd
                                                                   auto(15)
## 208
                                                   2.0 1999
                                                               4 manual(m5)
                                                                                f
                                                                                   21
                                                                                        29
          volkswagen
                                            gti
## 209
          volkswagen
                                            gti
                                                  2.0 1999
                                                                   auto(14)
                                                                                f
                                                                                   19
                                                                                        26
##
  210
                                                   2.0 2008
                                                               4 manual(m6)
                                                                                f
                                                                                   21
                                                                                        29
          volkswagen
                                            gti
##
  211
          volkswagen
                                                   2.0 2008
                                                                   auto(s6)
                                                                                f
                                                                                   22
                                                                                        29
                                            gti
## 212
                                                  2.8 1999
                                                                                        24
          volkswagen
                                                               6 manual(m5)
                                                                                f
                                                                                   17
                                            gti
## 213
                                         ietta
                                                   1.9
                                                       1999
                                                               4 manual(m5)
                                                                                f
                                                                                   33
                                                                                        44
          volkswagen
## 214
                                                  2.0 1999
                                                                                   21
                                                                                        29
          volkswagen
                                         jetta
                                                               4 manual(m5)
                                                                                f
## 215
          volkswagen
                                         jetta
                                                  2.0 1999
                                                                   auto(14)
                                                                                f
                                                                                   19
                                                                                        26
## 216
                                                  2.0 2008
                                                                   auto(s6)
                                                                                f
                                                                                   22
                                                                                        29
          volkswagen
                                         jetta
## 217
                                                  2.0 2008
                                                               4 manual(m6)
                                                                                f
                                                                                   21
                                                                                        29
          volkswagen
                                         jetta
## 218
                                                  2.5 2008
                                                                                f
                                                                                   21
                                                                                        20
          volkswagen
                                         jetta
                                                                   auto(s6)
## 219
                                                               5 manual(m5)
                                                                                        29
          volkswagen
                                         jetta
                                                  2.5 2008
                                                                                f
                                                                                   21
## 220
          volkswagen
                                                  2.8 1999
                                                                   auto(14)
                                                                                f
                                                                                   16
                                                                                        23
                                         jetta
  221
##
          volkswagen
                                         jetta
                                                   2.8 1999
                                                               6 manual(m5)
                                                                                f
                                                                                   17
                                                                                        24
## 222
                                                   1.9 1999
                                                                                   35
                                                                 manual(m5)
                                                                                f
                                                                                        44
          volkswagen
                                    new beetle
## 223
          volkswagen
                                    new beetle
                                                   1.9 1999
                                                                   auto(14)
                                                                                f
                                                                                   29
                                                                                        41
## 224
                                                  2.0 1999
                                                                                f
                                                                                   21
                                                                                        29
          volkswagen
                                    new beetle
                                                               4 manual(m5)
## 225
          volkswagen
                                    new beetle
                                                   2.0 1999
                                                                   auto(14)
                                                                                f
                                                                                   19
                                                                                        26
## 226
                                                                                f
                                                                                        28
          volkswagen
                                    new beetle
                                                   2.5 2008
                                                               5 manual(m5)
                                                                                   20
## 227
          volkswagen
                                    new beetle
                                                  2.5 2008
                                                                   auto(s6)
                                                                                f
                                                                                   20
                                                                                        29
   228
##
          volkswagen
                                                   1.8
                                                      1999
                                                               4 manual(m5)
                                                                                f
                                                                                   21
                                                                                        29
                                        passat
##
  229
                                                                                f
                                                                                   18
                                                                                        29
                                                   1.8 1999
                                                                   auto(15)
          volkswagen
                                        passat
## 230
          volkswagen
                                        passat
                                                  2.0 2008
                                                                   auto(s6)
                                                                                f
                                                                                   19
                                                                                        28
                                                  2.0 2008
                                                               4 manual(m6)
## 231
          volkswagen
                                                                                f
                                                                                   21
                                                                                        29
                                        passat
## 232
          volkswagen
                                                   2.8 1999
                                                                   auto(15)
                                                                                f
                                                                                   16
                                                                                        26
                                        passat
```

	233	volkswagen		passat		1999		manual(m5)	f	18	26
	234	volkswagen		passat	3.6	2008	6	auto(s6)	f	17	26
##	1	fl	class								
##		р	compact								
##		р	compact								
##		p	compact								
##		p	compact								
##		p	compact								
## ##		p	compact								
##		p	compact								
##		p	compact								
##		p D	compact								
##		p D	compact								
##		p	compact								
##		p	compact								
##		p	compact								
##		p	compact								
##		p D	compact midsize								
##		p n	midsize								
##		p n	midsize								
##		p r									
##		e	suv suv								
##		r	suv								
	22	r	suv								
##		r	suv								
##		р	2seater								
##		p	2seater								
##		p	2seater								
##		p	2seater								
##	28	p	2seater								
##	29	r	suv								
##	30	е	suv								
##	31	r	suv								
##	32	d	suv								
##	33	r	midsize								
##	34	r	midsize								
##	35	r	midsize								
##	36	r	midsize								
##		r	midsize								
##		r	minivan								
##		r	minivan								
##		r	minivan								
##		r	minivan								
##		r	minivan								
##		r	minivan								
##		е	minivan								
##		r	minivan								
##		r	minivan								
##		r	minivan								
##		r	minivan								
##		r	pickup								
##		r	pickup								
##	51	r	pickup								

```
## 52
               pickup
        r
## 53
        r
               pickup
## 54
         r
               pickup
## 55
               pickup
         е
## 56
        r
               pickup
## 57
        r
               pickup
## 58
        r
                  suv
## 59
         r
                  suv
## 60
         е
                  suv
##
   61
         r
                  suv
##
   62
         r
                  suv
   63
##
         r
                  suv
##
   64
        r
                  suv
##
   65
               pickup
         r
## 66
         е
               pickup
## 67
         r
               pickup
## 68
         r
               pickup
               pickup
##
   69
         r
##
   70
               pickup
         е
   71
##
        r
               pickup
## 72
        r
               pickup
## 73
         r
               pickup
## 74
        r
               pickup
## 75
        r
                  suv
## 76
         r
                  suv
##
   77
         r
                  suv
##
   78
         r
                  suv
##
   79
         r
                  suv
## 80
         r
                  suv
## 81
        r
                  suv
## 82
         r
                  suv
## 83
         r
                  suv
##
   84
         r
               pickup
## 85
        r
               pickup
   86
##
        r
               pickup
## 87
        r
               pickup
## 88
         r
               pickup
## 89
        r
               pickup
## 90
        r
               pickup
## 91
        r subcompact
## 92
        r subcompact
## 93
        r subcompact
## 94
        r subcompact
## 95
        r subcompact
## 96
        r subcompact
## 97
        r subcompact
## 98
        r subcompact
## 99
        p subcompact
## 100
        r subcompact
## 101
        r subcompact
## 102
        r subcompact
## 103
        p subcompact
## 104
        r subcompact
## 105 r subcompact
```

```
## 106 r subcompact
## 107
        c subcompact
## 108
        p subcompact
## 109
        r
             midsize
## 110
        r
             midsize
## 111
        r
             midsize
## 112
        r
             midsize
## 113
             midsize
        r
## 114
        r
             midsize
## 115
             midsize
        r
## 116
        r subcompact
## 117
        r subcompact
## 118
        r subcompact
## 119
        r subcompact
## 120
        r subcompact
## 121
        r subcompact
## 122
        r subcompact
## 123
        d
                  suv
## 124
        r
                  suv
## 125
        r
                  suv
## 126
        r
                  suv
## 127
        е
                  suv
## 128
        r
                  suv
## 129
        r
                  suv
## 130
        р
                  suv
## 131
        p
                  suv
## 132
        r
                  suv
## 133
        r
                  suv
## 134
        p
                  suv
## 135
        r
                  suv
## 136
        p
                  suv
## 137
        r
                  suv
## 138
        r
                  suv
## 139
                  suv
        r
## 140
        r
                  suv
## 141
        r
                  suv
## 142
        r
             compact
## 143
        r
             compact
## 144
             midsize
        r
## 145
             midsize
        r
## 146
        р
             midsize
## 147
        р
             midsize
## 148
        r
             midsize
## 149
        r
             midsize
## 150
             midsize
        p
## 151
        r
                  suv
## 152
        r
                  suv
## 153
        p
                  suv
## 154
        p
                  suv
## 155
             midsize
        r
## 156
        р
             midsize
## 157
             midsize
        r
## 158
             midsize
        r
## 159
        р
             midsize
```

```
## 160
        r
                  suv
## 161
        r
                  suv
## 162
        r
                  suv
## 163
                  suv
        p
## 164
        r
                  suv
## 165
                  suv
        p
## 166
        r subcompact
        r subcompact
## 167
## 168
        r subcompact
## 169
        r subcompact
## 170
        p
              compact
## 171
        r
              compact
## 172
        p
              compact
## 173
        r
              compact
## 174
        r
                  suv
## 175
        r
                  suv
## 176
        r
                  suv
## 177
        r
                  suv
## 178
        r
                  suv
## 179
        r
                  suv
## 180
        r
             midsize
## 181
        r
             midsize
## 182
             midsize
        r
## 183
        r
             midsize
## 184
        r
             midsize
## 185
        r
             midsize
## 186
        r
             midsize
## 187
        r
              compact
## 188
        r
              compact
## 189
        r
              compact
## 190
        r
              compact
## 191
        r
              compact
## 192
              compact
## 193
        r
              compact
## 194
        r
              compact
## 195
        r
              compact
## 196
        r
              compact
## 197
        r
              compact
## 198
              compact
        r
## 199
        r
                  suv
## 200
        r
                  suv
## 201
        r
               pickup
## 202
        r
               pickup
## 203
        r
               pickup
## 204
        r
              pickup
## 205
        r
               pickup
## 206
        r
               pickup
## 207
              pickup
## 208
        r
              compact
## 209
        r
              compact
## 210
        р
              compact
## 211
              compact
        p
## 212
        r
              compact
## 213
       d
              compact
```

```
## 214 r
             compact
## 215 r
             compact
## 216 p
             compact
## 217
             compact
       р
## 218
       r
             compact
## 219 r
             compact
## 220 r
             compact
## 221 r
             compact
## 222
       d subcompact
## 223
       d subcompact
## 224
       r subcompact
## 225
       r subcompact
## 226
       r subcompact
## 227
        r subcompact
## 228
            midsize
       p
## 229
            midsize
       р
## 230
            midsize
       р
## 231
            midsize
       p
## 232
            midsize
       р
## 233
       р
            midsize
            midsize
## 234
       р
```

2. Which manufacturer has the most models in this data set? Which model has the most variations? answer: Dodge, it has 37 models.

```
most_model <- mpg_data %>%
  group_by(manufacturer, model) %>% tally(sort = TRUE)
most_model
```

```
## # A tibble: 38 x 3
## # Groups:
               manufacturer [15]
##
      manufacturer model
                                            n
##
      <chr>
                   <chr>
                                        <int>
  1 dodge
##
                   caravan 2wd
                                           11
## 2 dodge
                   ram 1500 pickup 4wd
                                           10
                   dakota pickup 4wd
                                            9
## 3 dodge
                                            9
## 4 ford
                   mustang
## 5 honda
                                            9
                   civic
                                            9
## 6 volkswagen
                   jetta
##
  7 audi
                                            8
                   a4 quattro
##
   8 jeep
                   grand cherokee 4wd
                                            8
## 9 subaru
                   impreza awd
                                            8
## 10 audi
                                            7
## # ... with 28 more rows
```

a. Group the manufacturers and find the unique models. Copy the codes and result.

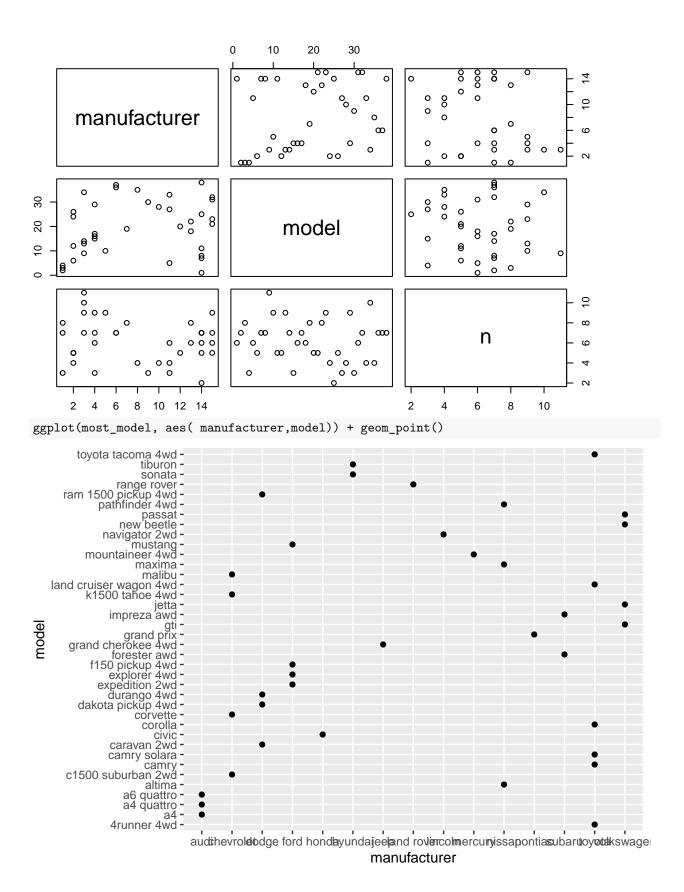
```
unique_model <- mpg_data %>% group_by(manufacturer,model) %>%
  distinct(model) %>% count()
unique_model
```

```
## # A tibble: 38 x 3
## # Groups: manufacturer, model [38]
```

```
##
     manufacturer model
                                        n
##
     <chr> <chr>
                                    <int>
   1 audi
                a4
##
                                        1
                a4 quattro
## 2 audi
                                        1
                a6 quattro
##
   3 audi
                                        1
## 4 chevrolet c1500 suburban 2wd
                                        1
## 5 chevrolet corvette
## 6 chevrolet k1500 tahoe 4wd
                                        1
##
   7 chevrolet malibu
               caravan 2wd
## 8 dodge
                                        1
## 9 dodge
                 dakota pickup 4wd
                                        1
## 10 dodge
                  durango 4wd
                                        1
## # ... with 28 more rows
colnames(unique_model) <- c("Manufacturer", "Model", "Counts")</pre>
unique_model
## # A tibble: 38 x 3
## # Groups: Manufacturer, Model [38]
##
     Manufacturer Model
                                    Counts
##
     <chr>
                 <chr>
                                     <int>
   1 audi
##
                 a4
                                         1
                a4 quattro
a6 quattro
##
   2 audi
                                         1
## 3 audi
## 4 chevrolet c1500 suburban 2wd
## 5 chevrolet
                 corvette
                                         1
## 6 chevrolet k1500 tahoe 4wd
                                         1
## 7 chevrolet malibu
                                         1
## 8 dodge
                 caravan 2wd
                                         1
## 9 dodge
                  dakota pickup 4wd
                                         1
## 10 dodge
                  durango 4wd
                                         1
## # ... with 28 more rows
```

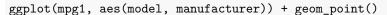
b. Graph the result by using plot() and ggplot(). Write the codes and its result.

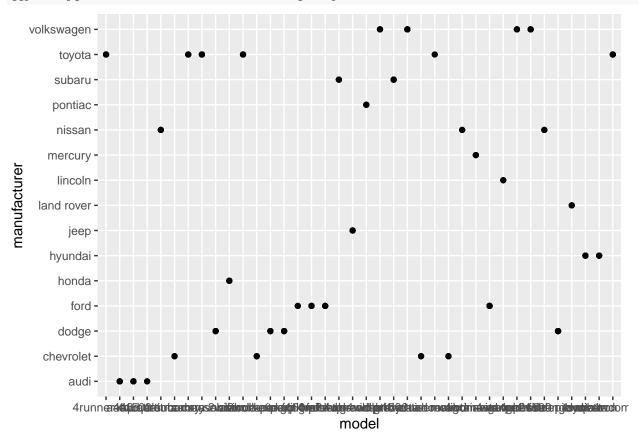
```
plot(most_model)
```



3. Same dataset will be used. You are going to show the relationship of the modeland the manufacturer. a.

What does ggplot(mpg, aes(model, manufacturer)) + geom\_point() show? The data shows the manufacturer and model in a very understanding way of using a graphics plot





- b. For you, is it useful? If not, how could you modify the data to make it more informative? answer adding a legend to easily find the data.
- 4. Using the pipe (%>%), group the model and get the number of cars per model. Show codes and its result.

```
cars_model <- mpg_data %>% group_by(model) %>% count()
cars_model
```

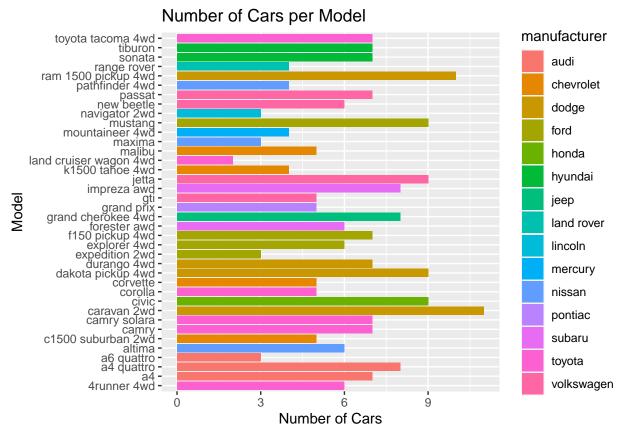
```
## # A tibble: 38 x 2
  # Groups:
                model [38]
##
      model
                               n
##
      <chr>
                           <int>
##
    1 4runner 4wd
                               6
                               7
##
                               8
##
    3 a4 quattro
                               3
##
    4 a6 quattro
                               6
##
    5 altima
    6 c1500 suburban 2wd
                               5
                               7
##
    7 camry
##
    8 camry solara
                               7
    9 caravan 2wd
                              11
```

```
## 10 civic 9
## # ... with 28 more rows
colnames(cars_model) <- c("Model","Counts")</pre>
```

a. Plot using the geom\_bar() + coord\_flip() just like what is shown below. Show codes and its result.

```
qplot(model,data = mpg1,
    main = "Number of Cars per Model",
    xlab = "Model",
    ylab = "Number of Cars", geom = "bar", fill = manufacturer) + coord_flip()
```

## Warning: `qplot()` was deprecated in ggplot2 3.4.0.



b. Use only the top 20 observations. Show code and results.

```
top <- cars_model[1:20,] %>% top_n(2)

## Selecting by Counts

top

## # A tibble: 20 x 2

## # Groups: Model [20]

## Model Counts
```

```
##
       <chr>
                             <int>
##
    1 4runner 4wd
                                  6
    2 a4
                                  7
##
                                  8
##
    3 a4 quattro
##
    4 a6 quattro
                                  3
    5 altima
                                  6
##
##
    6 c1500 suburban 2wd
                                  5
                                  7
##
    7 camry
##
    8 camry solara
                                  7
    9 caravan 2wd
##
                                 11
## 10 civic
                                  9
                                  5
## 11 corolla
## 12 corvette
                                  5
                                  9
## 13 dakota pickup 4wd
## 14 durango 4wd
                                  7
## 15 expedition 2wd
                                  3
## 16 explorer 4wd
                                  6
                                  7
## 17 f150 pickup 4wd
## 18 forester awd
                                  6
## 19 grand cherokee 4wd
                                  8
## 20 grand prix
                                  5
ggplot(top,aes(x = Model, y = Counts)) +
  geom_bar(stat = "Identity") +coord_flip()
            grand prix -
   grand cherokee 4wd -
          forester awd -
      f150 pickup 4wd -
          explorer 4wd -
        expedition 2wd -
         durango 4wd -
    dakota pickup 4wd -
              corvette -
               corolla -
                 civic -
          caravan 2wd -
         camry solara -
               camry -
  c1500 suburban 2wd -
               altima -
            a6 quattro -
            a4 quattro -
                   a4 -
          4runner 4wd -
                                            3
                                                               6
                                                                                   9
                         0
                                                         Counts
```

5. Plot the relationship between cyl - number of cylinders and displ - engine displacement using geom\_point with aesthetic colour = engine displacement. Title should be "Relationship between No. of Cylinders and

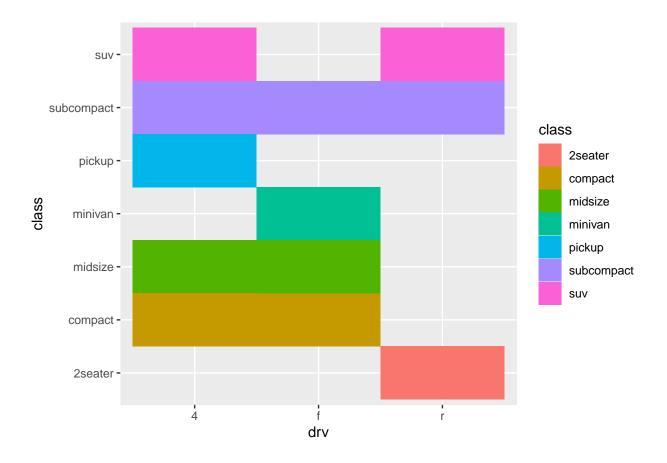
a. Show the codes and its result.

```
ggplot(data = mpg_data , mapping = aes(x = displ, y = cyl, main = "Relationship")
                                        between No of Cylinders and
                                        Engine Displacement")) +
  geom_point(mapping=aes(colour = "engine displacement"))
   8
   7 -
                                                                          colour
<del>-</del>6 €
                                                                               engine displacement
   5 -
            2
                      3
                                  4
                                             5
                                                        6
                                   displ
```

- b. How would you describe its relationship? answer the scatter plot shows that the cyl is in vertical lines(y-axis) and the displ are in in horizontal lines(x-axis). To easily locate the clustered data, just one look we can figure out wheres the Engine Displacement is. By having the engine displacement name in right middle side.
- 6. Get the total number of observations for drv type of drive train (f = front-wheel drive, r = rear wheel drive, 4 = 4wd) and class type of class (Example: suv, 2seater, etc.).

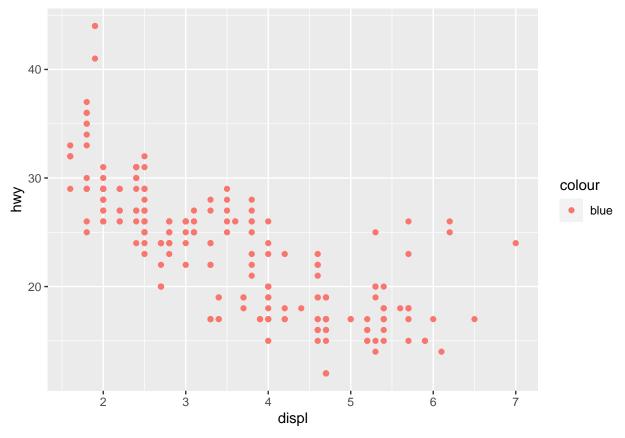
Plot using the geom\_tile() where the number of observations for class be used as a fill for aesthetics. a. Show the codes and its result for the narrative in #6.

```
ggplot(data = mpg_data, mapping = aes(x = drv, y = class)) +
  geom_tile(aes(fill=class))
```



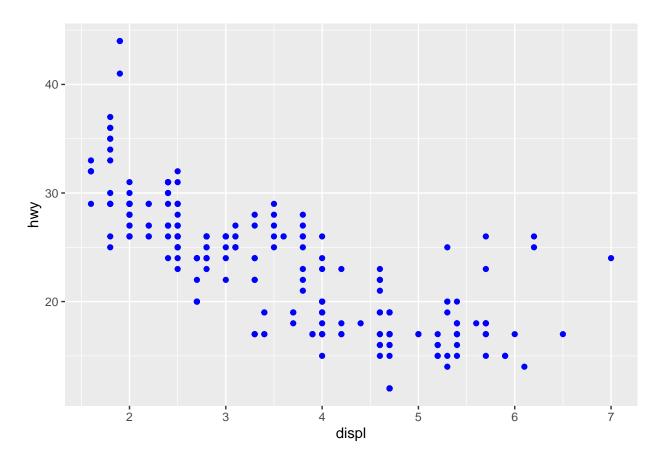
- b. Interpret the result. answer by mapping a geometric tile, the geom\_title was shown in a diffrent colors, the drv are in the X axis while the class are in the Y axis.
- 7. Discuss the difference between these codes. Its outputs for each are shown below. answer the graph are almost the same but the first code the colour blue ignore while in the second code the colour blue displayed. The r studio are t00 much sensitive in placing a proper code in the source code. first code

```
ggplot(data = mpg) +
geom_point(mapping = aes(x = displ, y = hwy, colour = "blue"))
```



second code

```
ggplot(data = mpg) +
geom_point(mapping = aes(x = displ, y = hwy), colour = "blue")
```

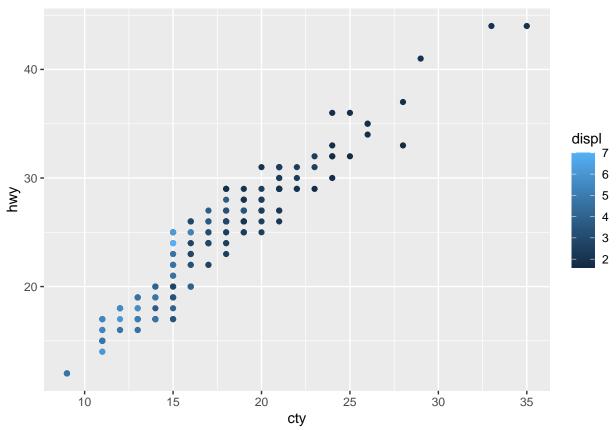


8. Try to run the command?mpg. What is the result of this command? answer - the result are in the help option, it shows the description for the data set of mpg.

#### ?mpg

- a. Which variables from mpg dataset are categorical? answer The manufacturer, model, trans, drv, fl, class are the categorical variables of mpg data set.
- b. Which are continuous variables? answer The dsipl, year, cyl, cty, and hwy are the continous variables of mpg data set.
- c. Plot the relationship between displ (engine displacement) and hwy(highway miles per gallon). Mapped it with a continuous variable you have identified in #5-b. What is its result? Why it produced such output? answer The data graph shows the data set of hwy,cyt and displ.

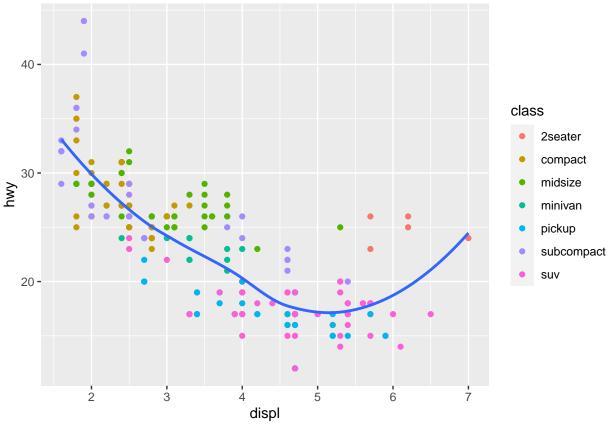
```
ggplot(mpg, aes(x = cty, y = hwy, colour = displ)) + geom_point()
```



9. Plot the relationship between displ (engine displacement) and hwy(highway miles per gallon) using  $geom\_point()$ . Add a trend line over the existing plot using  $geom\_smooth()$  with se=FALSE. Default method is "loess".

```
ggplot(data = mpg, mapping = aes(x = displ, y = hwy)) +
  geom_point(mapping=aes(color=class)) +
  geom_smooth(se = FALSE)
```

## `geom\_smooth()` using method = 'loess' and formula = 'y ~ x'



10. Using the relationship of displ and hwy, add a trend line over existing plot. Set these = FALSE to remove the confidence interval and method = lm to check for linear modeling.

```
ggplot(data = mpg, mapping = aes(x = displ, y = hwy, color = class)) +
geom_point() +
geom_smooth(se = FALSE, method = lm)
```

## `geom\_smooth()` using formula = 'y ~ x'

