

# RWorksheet\_Gallenero#4c

2023-11-23

1. Use the dataset mpg a. Show your solutions on how to import a csv file into the environment.

```
library(readr)
```

```
dataset_mpg <- read.csv("mpg.csv")  
dataset_mpg
```

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

## 39	dodge	caravan 2wd	3.0 1999	6	auto(14)	f	17	24
## 40	dodge	caravan 2wd	3.3 1999	6	auto(14)	f	16	22
## 41	dodge	caravan 2wd	3.3 1999	6	auto(14)	f	16	22
## 42	dodge	caravan 2wd	3.3 2008	6	auto(14)	f	17	24
## 43	dodge	caravan 2wd	3.3 2008	6	auto(14)	f	17	24
## 44	dodge	caravan 2wd	3.3 2008	6	auto(14)	f	11	17
## 45	dodge	caravan 2wd	3.8 1999	6	auto(14)	f	15	22
## 46	dodge	caravan 2wd	3.8 1999	6	auto(14)	f	15	21
## 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	dodge	dakota pickup 4wd	3.7 2008	6	auto(14)	4	14	18
## 51	dodge	dakota pickup 4wd	3.9 1999	6	auto(14)	4	13	17
## 52	dodge	dakota pickup 4wd	3.9 1999	6	manual(m5)	4	14	17
## 53	dodge	dakota pickup 4wd	4.7 2008	8	auto(15)	4	14	19
## 54	dodge	dakota pickup 4wd	4.7 2008	8	auto(15)	4	14	19
## 55	dodge	dakota pickup 4wd	4.7 2008	8	auto(15)	4	9	12
## 56	dodge	dakota pickup 4wd	5.2 1999	8	manual(m5)	4	11	17
## 57	dodge	dakota pickup 4wd	5.2 1999	8	auto(14)	4	11	15
## 58	dodge	durango 4wd	3.9 1999	6	auto(14)	4	13	17
## 59	dodge	durango 4wd	4.7 2008	8	auto(15)	4	13	17
## 60	dodge	durango 4wd	4.7 2008	8	auto(15)	4	9	12
## 61	dodge	durango 4wd	4.7 2008	8	auto(15)	4	13	17
## 62	dodge	durango 4wd	5.2 1999	8	auto(14)	4	11	16
## 63	dodge	durango 4wd	5.7 2008	8	auto(15)	4	13	18
## 64	dodge	durango 4wd	5.9 1999	8	auto(14)	4	11	15
## 65	dodge	ram 1500 pickup 4wd	4.7 2008	8	manual(m6)	4	12	16
## 66	dodge	ram 1500 pickup 4wd	4.7 2008	8	auto(15)	4	9	12
## 67	dodge	ram 1500 pickup 4wd	4.7 2008	8	auto(15)	4	13	17
## 68	dodge	ram 1500 pickup 4wd	4.7 2008	8	auto(15)	4	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	8	auto(14)	4	11	15
## 72	dodge	ram 1500 pickup 4wd	5.2 1999	8	manual(m5)	4	11	16
## 73	dodge	ram 1500 pickup 4wd	5.7 2008	8	auto(15)	4	13	17
## 74	dodge	ram 1500 pickup 4wd	5.9 1999	8	auto(14)	4	11	15
## 75	ford	expedition 2wd	4.6 1999	8	auto(14)	r	11	17
## 76	ford	expedition 2wd	5.4 1999	8	auto(14)	r	11	17
## 77	ford	expedition 2wd	5.4 2008	8	auto(16)	r	12	18
## 78	ford	explorer 4wd	4.0 1999	6	auto(15)	4	14	17
## 79	ford	explorer 4wd	4.0 1999	6	manual(m5)	4	15	19
## 80	ford	explorer 4wd	4.0 1999	6	auto(15)	4	14	17
## 81	ford	explorer 4wd	4.0 2008	6	auto(15)	4	13	19
## 82	ford	explorer 4wd	4.6 2008	8	auto(16)	4	13	19
## 83	ford	explorer 4wd	5.0 1999	8	auto(14)	4	13	17
## 84	ford	f150 pickup 4wd	4.2 1999	6	auto(14)	4	14	17
## 85	ford	f150 pickup 4wd	4.2 1999	6	manual(m5)	4	14	17
## 86	ford	f150 pickup 4wd	4.6 1999	8	manual(m5)	4	13	16
## 87	ford	f150 pickup 4wd	4.6 1999	8	auto(14)	4	13	16
## 88	ford	f150 pickup 4wd	4.6 2008	8	auto(14)	4	13	17
## 89	ford	f150 pickup 4wd	5.4 1999	8	auto(14)	4	11	15
## 90	ford	f150 pickup 4wd	5.4 2008	8	auto(14)	4	13	17
## 91	ford	mustang	3.8 1999	6	manual(m5)	r	18	26
## 92	ford	mustang	3.8 1999	6	auto(14)	r	18	25

## 93	ford	mustang	4.0	2008	6	manual(m5)	r	17	26
## 94	ford	mustang	4.0	2008	6	auto(15)	r	16	24
## 95	ford	mustang	4.6	1999	8	auto(14)	r	15	21
## 96	ford	mustang	4.6	1999	8	manual(m5)	r	15	22
## 97	ford	mustang	4.6	2008	8	manual(m5)	r	15	23
## 98	ford	mustang	4.6	2008	8	auto(15)	r	15	22
## 99	ford	mustang	5.4	2008	8	manual(m6)	r	14	20
## 100	honda	civic	1.6	1999	4	manual(m5)	f	28	33
## 101	honda	civic	1.6	1999	4	auto(14)	f	24	32
## 102	honda	civic	1.6	1999	4	manual(m5)	f	25	32
## 103	honda	civic	1.6	1999	4	manual(m5)	f	23	29
## 104	honda	civic	1.6	1999	4	auto(14)	f	24	32
## 105	honda	civic	1.8	2008	4	manual(m5)	f	26	34
## 106	honda	civic	1.8	2008	4	auto(15)	f	25	36
## 107	honda	civic	1.8	2008	4	auto(15)	f	24	36
## 108	honda	civic	2.0	2008	4	manual(m6)	f	21	29
## 109	hyundai	sonata	2.4	1999	4	auto(14)	f	18	26
## 110	hyundai	sonata	2.4	1999	4	manual(m5)	f	18	27
## 111	hyundai	sonata	2.4	2008	4	auto(14)	f	21	30
## 112	hyundai	sonata	2.4	2008	4	manual(m5)	f	21	31
## 113	hyundai	sonata	2.5	1999	6	auto(14)	f	18	26
## 114	hyundai	sonata	2.5	1999	6	manual(m5)	f	18	26
## 115	hyundai	sonata	3.3	2008	6	auto(15)	f	19	28
## 116	hyundai	tiburon	2.0	1999	4	auto(14)	f	19	26
## 117	hyundai	tiburon	2.0	1999	4	manual(m5)	f	19	29
## 118	hyundai	tiburon	2.0	2008	4	manual(m5)	f	20	28
## 119	hyundai	tiburon	2.0	2008	4	auto(14)	f	20	27
## 120	hyundai	tiburon	2.7	2008	6	auto(14)	f	17	24
## 121	hyundai	tiburon	2.7	2008	6	manual(m6)	f	16	24
## 122	hyundai	tiburon	2.7	2008	6	manual(m5)	f	17	24
## 123	jeep	grand cherokee 4wd	3.0	2008	6	auto(15)	4	17	22
## 124	jeep	grand cherokee 4wd	3.7	2008	6	auto(15)	4	15	19
## 125	jeep	grand cherokee 4wd	4.0	1999	6	auto(14)	4	15	20
## 126	jeep	grand cherokee 4wd	4.7	1999	8	auto(14)	4	14	17
## 127	jeep	grand cherokee 4wd	4.7	2008	8	auto(15)	4	9	12
## 128	jeep	grand cherokee 4wd	4.7	2008	8	auto(15)	4	14	19
## 129	jeep	grand cherokee 4wd	5.7	2008	8	auto(15)	4	13	18
## 130	jeep	grand cherokee 4wd	6.1	2008	8	auto(15)	4	11	14
## 131	land rover	range rover	4.0	1999	8	auto(14)	4	11	15
## 132	land rover	range rover	4.2	2008	8	auto(s6)	4	12	18
## 133	land rover	range rover	4.4	2008	8	auto(s6)	4	12	18
## 134	land rover	range rover	4.6	1999	8	auto(14)	4	11	15
## 135	lincoln	navigator 2wd	5.4	1999	8	auto(14)	r	11	17
## 136	lincoln	navigator 2wd	5.4	1999	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
## 139	mercury	mountaineer 4wd	4.0	2008	6	auto(15)	4	13	19
## 140	mercury	mountaineer 4wd	4.6	2008	8	auto(16)	4	13	19
## 141	mercury	mountaineer 4wd	5.0	1999	8	auto(14)	4	13	17
## 142	nissan	altima	2.4	1999	4	manual(m5)	f	21	29
## 143	nissan	altima	2.4	1999	4	auto(14)	f	19	27
## 144	nissan	altima	2.5	2008	4	auto(av)	f	23	31
## 145	nissan	altima	2.5	2008	4	manual(m6)	f	23	32
## 146	nissan	altima	3.5	2008	6	manual(m6)	f	19	27

## 147	nissan	altima	3.5	2008	6	auto(av)	f	19	26
## 148	nissan	maxima	3.0	1999	6	auto(l4)	f	18	26
## 149	nissan	maxima	3.0	1999	6	manual(m5)	f	19	25
## 150	nissan	maxima	3.5	2008	6	auto(av)	f	19	25
## 151	nissan	pathfinder 4wd	3.3	1999	6	auto(l4)	4	14	17
## 152	nissan	pathfinder 4wd	3.3	1999	6	manual(m5)	4	15	17
## 153	nissan	pathfinder 4wd	4.0	2008	6	auto(l5)	4	14	20
## 154	nissan	pathfinder 4wd	5.6	2008	8	auto(s5)	4	12	18
## 155	pontiac	grand prix	3.1	1999	6	auto(l4)	f	18	26
## 156	pontiac	grand prix	3.8	1999	6	auto(l4)	f	16	26
## 157	pontiac	grand prix	3.8	1999	6	auto(l4)	f	17	27
## 158	pontiac	grand prix	3.8	2008	6	auto(l4)	f	18	28
## 159	pontiac	grand prix	5.3	2008	8	auto(s4)	f	16	25
## 160	subaru	forester awd	2.5	1999	4	manual(m5)	4	18	25
## 161	subaru	forester awd	2.5	1999	4	auto(l4)	4	18	24
## 162	subaru	forester awd	2.5	2008	4	manual(m5)	4	20	27
## 163	subaru	forester awd	2.5	2008	4	manual(m5)	4	19	25
## 164	subaru	forester awd	2.5	2008	4	auto(l4)	4	20	26
## 165	subaru	forester awd	2.5	2008	4	auto(l4)	4	18	23
## 166	subaru	impreza awd	2.2	1999	4	auto(l4)	4	21	26
## 167	subaru	impreza awd	2.2	1999	4	manual(m5)	4	19	26
## 168	subaru	impreza awd	2.5	1999	4	manual(m5)	4	19	26
## 169	subaru	impreza awd	2.5	1999	4	auto(l4)	4	19	26
## 170	subaru	impreza awd	2.5	2008	4	auto(s4)	4	20	25
## 171	subaru	impreza awd	2.5	2008	4	auto(s4)	4	20	27
## 172	subaru	impreza awd	2.5	2008	4	manual(m5)	4	19	25
## 173	subaru	impreza awd	2.5	2008	4	manual(m5)	4	20	27
## 174	toyota	4runner 4wd	2.7	1999	4	manual(m5)	4	15	20
## 175	toyota	4runner 4wd	2.7	1999	4	auto(l4)	4	16	20
## 176	toyota	4runner 4wd	3.4	1999	6	auto(l4)	4	15	19
## 177	toyota	4runner 4wd	3.4	1999	6	manual(m5)	4	15	17
## 178	toyota	4runner 4wd	4.0	2008	6	auto(l5)	4	16	20
## 179	toyota	4runner 4wd	4.7	2008	8	auto(l5)	4	14	17
## 180	toyota	camry	2.2	1999	4	manual(m5)	f	21	29
## 181	toyota	camry	2.2	1999	4	auto(l4)	f	21	27
## 182	toyota	camry	2.4	2008	4	manual(m5)	f	21	31
## 183	toyota	camry	2.4	2008	4	auto(l5)	f	21	31
## 184	toyota	camry	3.0	1999	6	auto(l4)	f	18	26
## 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	4	auto(l4)	f	21	27
## 188	toyota	camry solara	2.2	1999	4	manual(m5)	f	21	29
## 189	toyota	camry solara	2.4	2008	4	manual(m5)	f	21	31
## 190	toyota	camry solara	2.4	2008	4	auto(s5)	f	22	31
## 191	toyota	camry solara	3.0	1999	6	auto(l4)	f	18	26
## 192	toyota	camry solara	3.0	1999	6	manual(m5)	f	18	26
## 193	toyota	camry solara	3.3	2008	6	auto(s5)	f	18	27
## 194	toyota	corolla	1.8	1999	4	auto(l3)	f	24	30
## 195	toyota	corolla	1.8	1999	4	auto(l4)	f	24	33
## 196	toyota	corolla	1.8	1999	4	manual(m5)	f	26	35
## 197	toyota	corolla	1.8	2008	4	manual(m5)	f	28	37
## 198	toyota	corolla	1.8	2008	4	auto(l4)	f	26	35
## 199	toyota	land cruiser wagon 4wd	4.7	1999	8	auto(l4)	4	11	15
## 200	toyota	land cruiser wagon 4wd	5.7	2008	8	auto(s6)	4	13	18

## 201	toyota	toyota tacoma 4wd	2.7	1999	4 manual(m5)	4	15	20
## 202	toyota	toyota tacoma 4wd	2.7	1999	4 auto(l4)	4	16	20
## 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	toyota	toyota tacoma 4wd	3.4	1999	6 auto(l4)	4	15	19
## 206	toyota	toyota tacoma 4wd	4.0	2008	6 manual(m6)	4	15	18
## 207	toyota	toyota tacoma 4wd	4.0	2008	6 auto(l5)	4	16	20
## 208	volkswagen	gti	2.0	1999	4 manual(m5)	f	21	29
## 209	volkswagen	gti	2.0	1999	4 auto(l4)	f	19	26
## 210	volkswagen	gti	2.0	2008	4 manual(m6)	f	21	29
## 211	volkswagen	gti	2.0	2008	4 auto(s6)	f	22	29
## 212	volkswagen	gti	2.8	1999	6 manual(m5)	f	17	24
## 213	volkswagen	jetta	1.9	1999	4 manual(m5)	f	33	44
## 214	volkswagen	jetta	2.0	1999	4 manual(m5)	f	21	29
## 215	volkswagen	jetta	2.0	1999	4 auto(l4)	f	19	26
## 216	volkswagen	jetta	2.0	2008	4 auto(s6)	f	22	29
## 217	volkswagen	jetta	2.0	2008	4 manual(m6)	f	21	29
## 218	volkswagen	jetta	2.5	2008	5 auto(s6)	f	21	29
## 219	volkswagen	jetta	2.5	2008	5 manual(m5)	f	21	29
## 220	volkswagen	jetta	2.8	1999	6 auto(l4)	f	16	23
## 221	volkswagen	jetta	2.8	1999	6 manual(m5)	f	17	24
## 222	volkswagen	new beetle	1.9	1999	4 manual(m5)	f	35	44
## 223	volkswagen	new beetle	1.9	1999	4 auto(l4)	f	29	41
## 224	volkswagen	new beetle	2.0	1999	4 manual(m5)	f	21	29
## 225	volkswagen	new beetle	2.0	1999	4 auto(l4)	f	19	26
## 226	volkswagen	new beetle	2.5	2008	5 manual(m5)	f	20	28
## 227	volkswagen	new beetle	2.5	2008	5 auto(s6)	f	20	29
## 228	volkswagen	passat	1.8	1999	4 manual(m5)	f	21	29
## 229	volkswagen	passat	1.8	1999	4 auto(l5)	f	18	29
## 230	volkswagen	passat	2.0	2008	4 auto(s6)	f	19	28
## 231	volkswagen	passat	2.0	2008	4 manual(m6)	f	21	29
## 232	volkswagen	passat	2.8	1999	6 auto(l5)	f	16	26
## 233	volkswagen	passat	2.8	1999	6 manual(m5)	f	18	26
## 234	volkswagen	passat	3.6	2008	6 auto(s6)	f	17	26
##	fl	class						
## 1	p	compact						
## 2	p	compact						
## 3	p	compact						
## 4	p	compact						
## 5	p	compact						
## 6	p	compact						
## 7	p	compact						
## 8	p	compact						
## 9	p	compact						
## 10	p	compact						
## 11	p	compact						
## 12	p	compact						
## 13	p	compact						
## 14	p	compact						
## 15	p	compact						
## 16	p	midsize						
## 17	p	midsize						
## 18	p	midsize						
## 19	r	suv						

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

```

## 128	r	suv
## 129	r	suv
## 130	p	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	r	suv
## 140	r	suv
## 141	r	suv
## 142	r	compact
## 143	r	compact
## 144	r	midsize
## 145	r	midsize
## 146	p	midsize
## 147	p	midsize
## 148	r	midsize
## 149	r	midsize
## 150	p	midsize
## 151	r	suv
## 152	r	suv
## 153	p	suv
## 154	p	suv
## 155	r	midsize
## 156	p	midsize
## 157	r	midsize
## 158	r	midsize
## 159	p	midsize
## 160	r	suv
## 161	r	suv
## 162	r	suv
## 163	p	suv
## 164	r	suv
## 165	p	suv
## 166	r	subcompact
## 167	r	subcompact
## 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 r    midsize
## 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 r    compact
## 193 r    compact
## 194 r    compact
## 195 r    compact
## 196 r    compact
## 197 r    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 p    compact
## 211 p    compact
## 212 r    compact
## 213 d    compact
## 214 r    compact
## 215 r    compact
## 216 p    compact
## 217 p    compact
## 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 p    midsize
## 229 p    midsize
## 230 p    midsize
## 231 p    midsize
## 232 p    midsize
## 233 p    midsize
## 234 p    midsize

```

b. Which variables from mpg dataset are categorical?

```
var_mpg <- names(sapply(dataset_mpg, function(x) is.factor(x) || is.character(x)))
var_mpg
```

```
## [1] "manufacturer" "model"      "displ"      "year"      "cyl"
## [6] "trans"        "drv"        "cty"        "hwy"        "fl"
## [11] "class"
```

*# manufacturer, model, displ, year, cyl, trans, drv, cty, hwy, fl, and class are the variables from the*

c. Which are continuous variables?

```
cont <- sapply(dataset_mpg, is.numeric)
var_cont <- names(dataset_mpg)[cont]
var_cont
```

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

*# displ, year, cyl, cty, hwy are the continuous variables.*

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

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##   filter, lag
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

```
Most_models <- dataset_mpg %>%
  group_by(manufacturer) %>%
  summarise(number_models = n()) %>%
  filter(number_models == max(number_models))

cat("The manufacturer with the most models is:", Most_models$manufacturer, "\n")
```

```
## The manufacturer with the most models is: dodge
```

```
Most_variations <- dataset_mpg %>%
  group_by(model) %>%
  summarise(number_variations = n()) %>%
  filter(number_variations == max(number_variations))

cat("The model with the most variations is:", Most_variations$model, "\n")
```

```
## The model with the most variations is: caravan 2wd
```

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

```
library(dplyr)
```

```
manufacturers_models <- data.frame(Manufacturer = dataset_mpg$manufacturer, Model = dataset_mpg$model)
manufacturers_models
```

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

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

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

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

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

```
Unique_models <- unique(manufacturers_models)
Unique_models
```

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

```
## 194      toyota      corolla
## 199      toyota land cruiser wagon 4wd
## 201      toyota      toyota tacoma 4wd
## 208      volkswagen      gti
## 213      volkswagen      jetta
## 222      volkswagen      new beetle
## 228      volkswagen      passat
```

```
find_unique <- Unique_models %>%
  count(Unique_models$Manufacturer)
find_unique
```

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

```
unique_mods_factor <- factoredManufacturer <- as.factor(Unique_models$Manufacturer)
```

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

```
library(ggplot2)
library(dplyr)

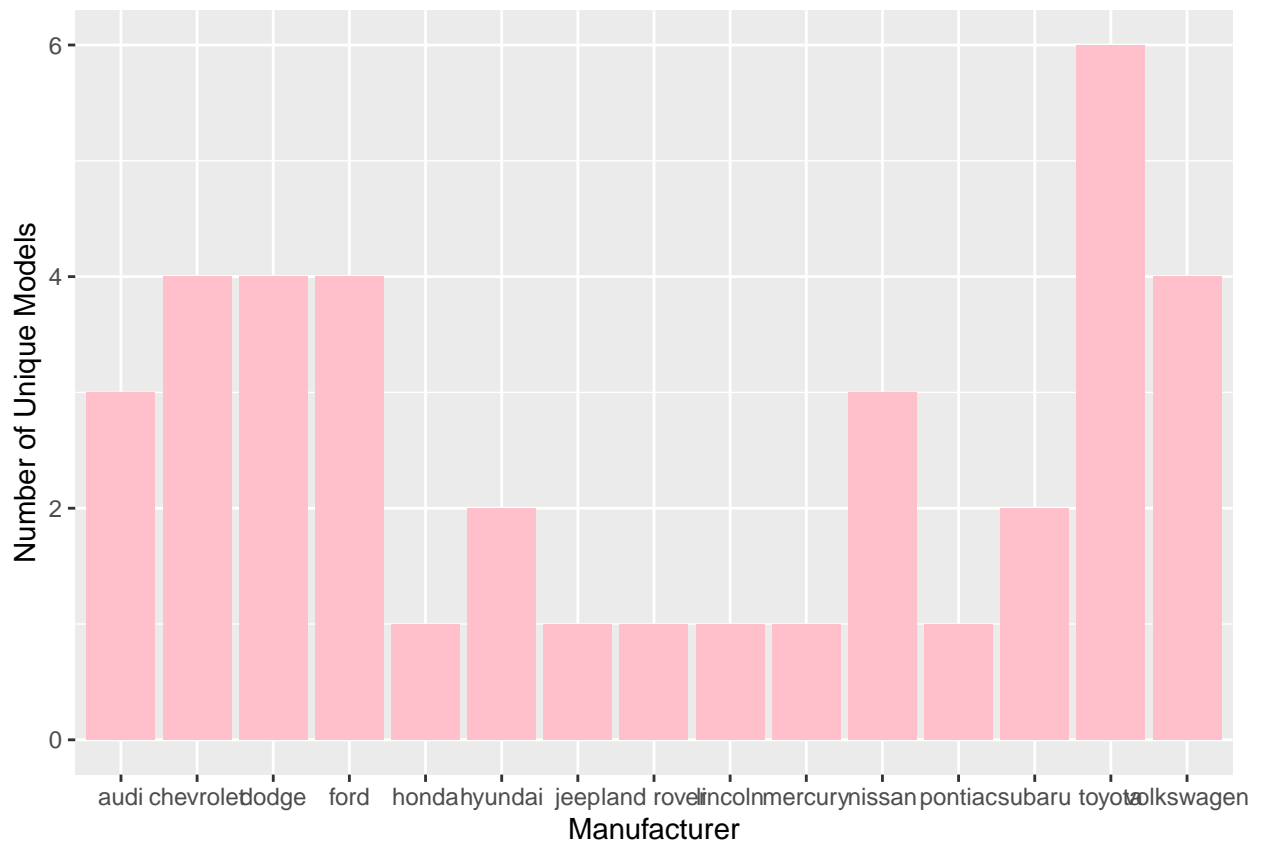
plot(as.factor(factoredManufacturer),
     main = "Unique Models of Manufacturers",
     xlab = "Manufacturer",
     ylab = "Number of Unique Models",
     col="pink",
     las = 2)
```



## Unique Models of Manufacturers

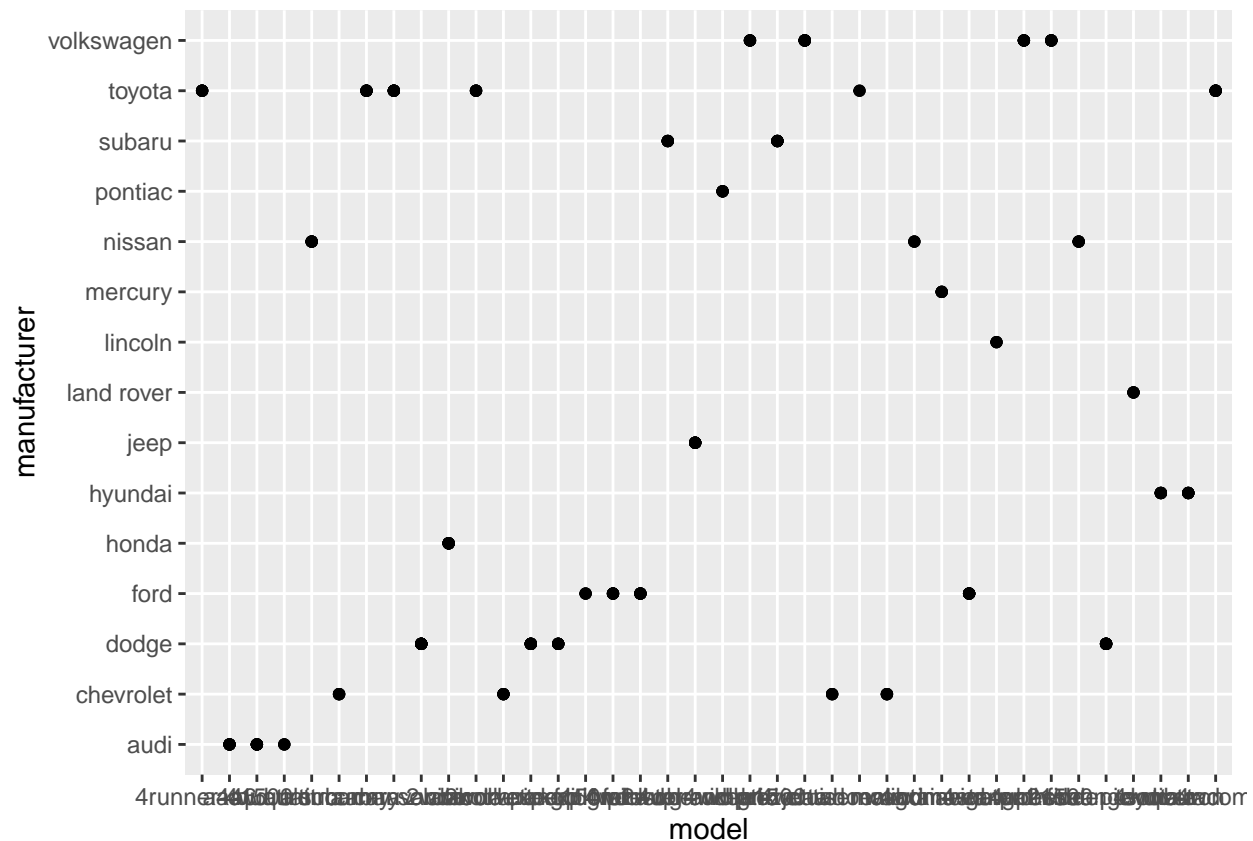


```
ggplot(find_unique, aes(x = `Unique_models$Manufacturer`, y = n)) +  
geom_bar(stat = "identity", fill = "pink") +  
  labs(x = "Manufacturer", y = "Number of Unique Models")
```



2. Same dataset will be used. You are going to show the relationship of the model and the manufacturer.  
 a. What does `ggplot(mpg, aes(model, manufacturer)) + geom_point()` show?

```
```r
ggplot(dataset_mpg, aes(model, manufacturer)) + geom_point()
```



*# The x-coordinate corresponds to a specific car model.  
 # The y-coordinate of a spot corresponds to the car model's manufacturer.  
 # By visualizing this scatter plot, you can see patterns and relationships between car models and manufacturers.*

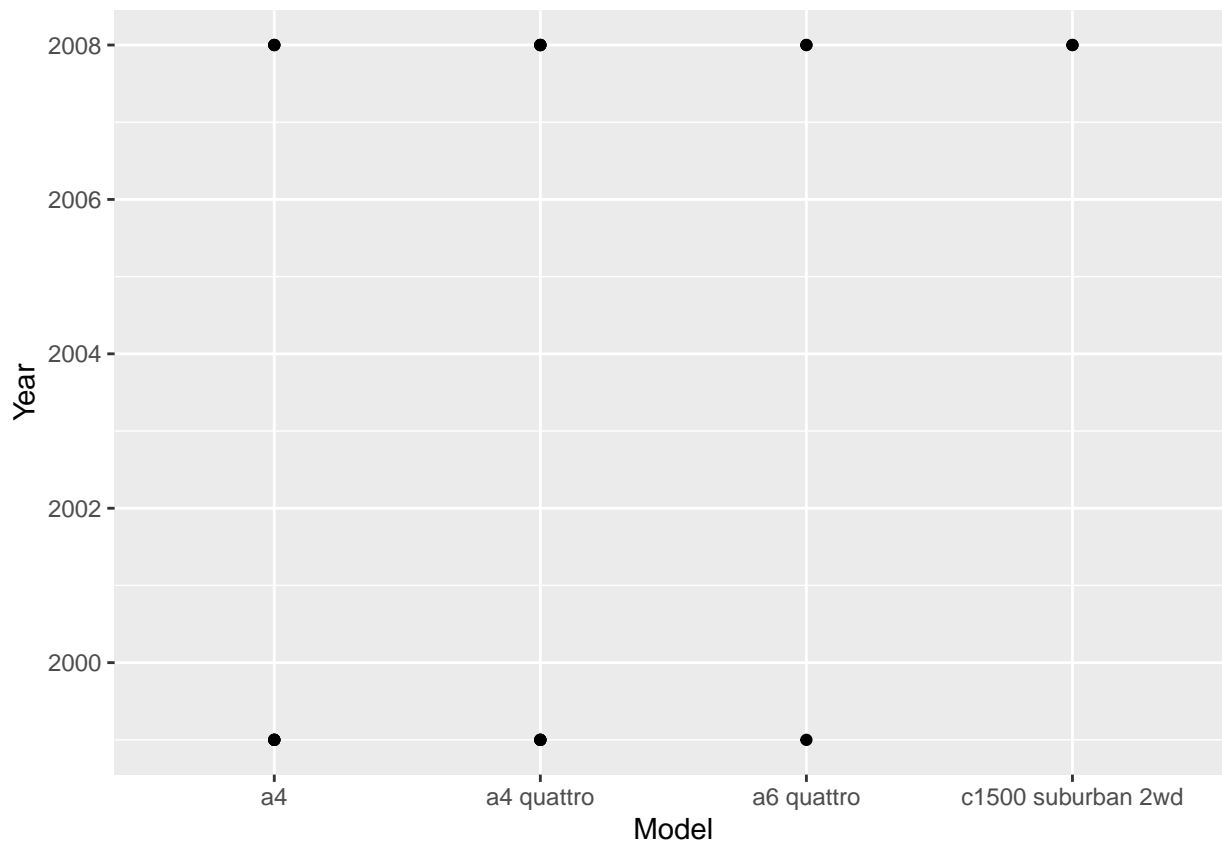
b. For you, is it useful? If not, how could you modify the data to make it more informative?

*# It is useful for showing the distribution of car models between manufacturers. It can be improved to*

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

```
top20_obs <- head(dataset_mpg, 20)

top20_plot <- ggplot(top20_obs, aes(x = model, y = year)) + geom_point() + labs(x = "Model", y = "Year")
top20_plot
```



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

```
library(dplyr)
```

```
model_num_car <- dataset_mpg %>%
  group_by(model) %>%
  summarize(number_cars = n())
```

```
model_num_car
```

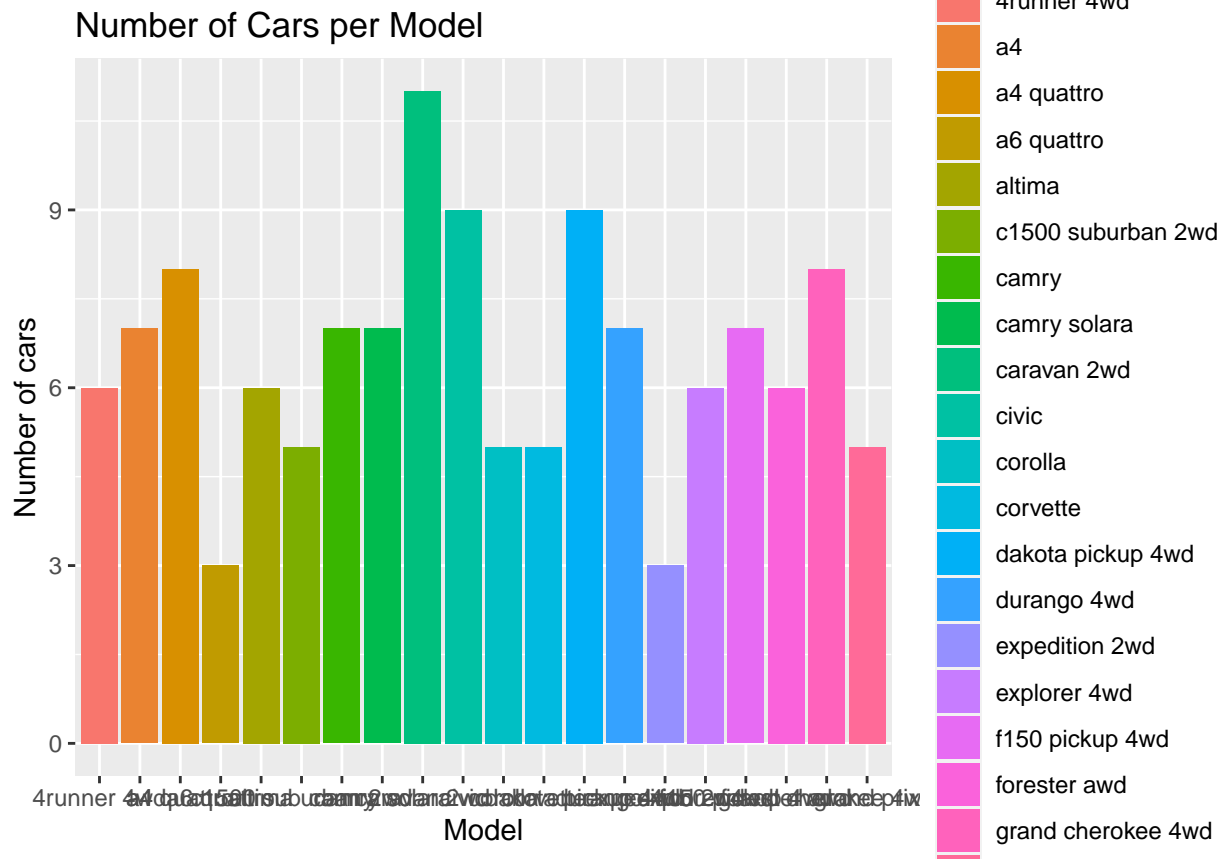
```
## # A tibble: 38 x 2
##   model          number_cars
##   <chr>             <int>
## 1 4runner 4wd           6
## 2 a4                   7
## 3 a4 quattro           8
## 4 a6 quattro           3
## 5 altima               6
## 6 c1500 suburban 2wd    5
## 7 camry                7
## 8 camry solara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

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

```
obs20 <- head(model_num_car, 20)
```

```
top20_obs <- ggplot(obs20, aes(x = model, y = number_cars, fill = model)) + geom_bar(stat = "identity")
```

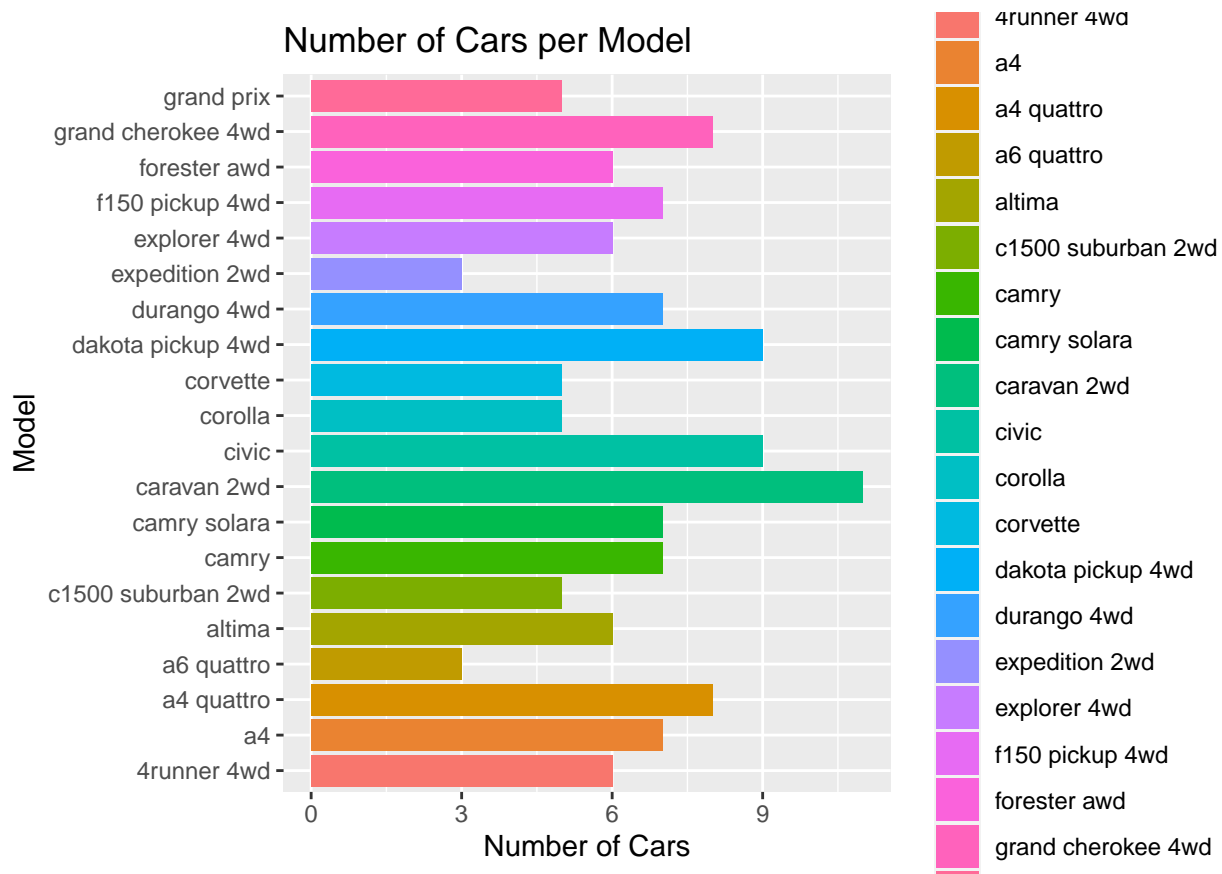
```
top20_obs
```



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

```
top20_flipped <- ggplot(obs20, aes(x = model, y = number_cars, fill = model)) + geom_bar(stat = "identity")
```

```
top20_flipped
```

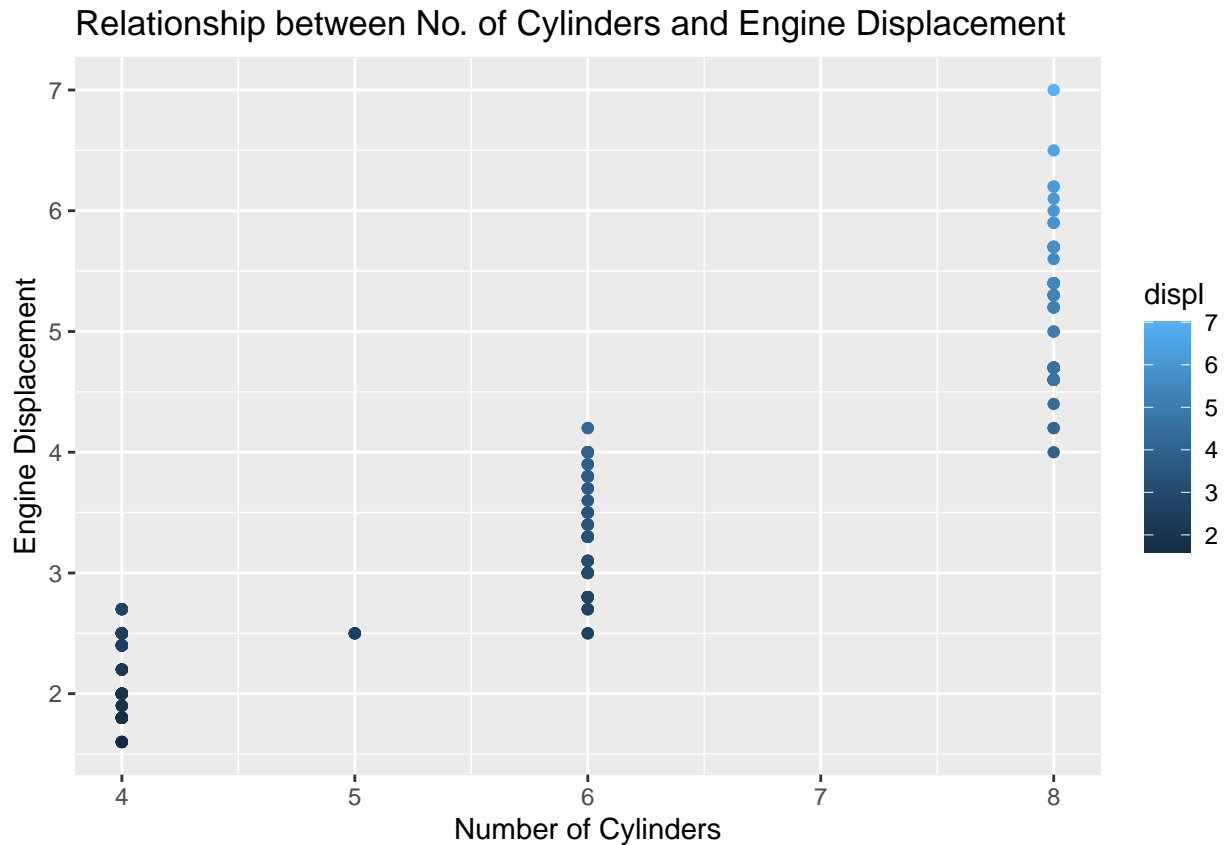


5. Plot the relationship between cyl - number of cylinders and displ - engine displacement using `geom_point` with aesthetic color = engine displacement. Title should be "Relationship between No. of Cylinders and Engine Displacement".

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

```
plot_cyl_displ <- ggplot(dataset_mpg, aes(x = cyl, y = displ, color = displ)) +
  geom_point() +
  labs(title = "Relationship between No. of Cylinders and Engine Displacement",
       x = "Number of Cylinders",
       y = "Engine Displacement")
```

plot\_cyl\_displ



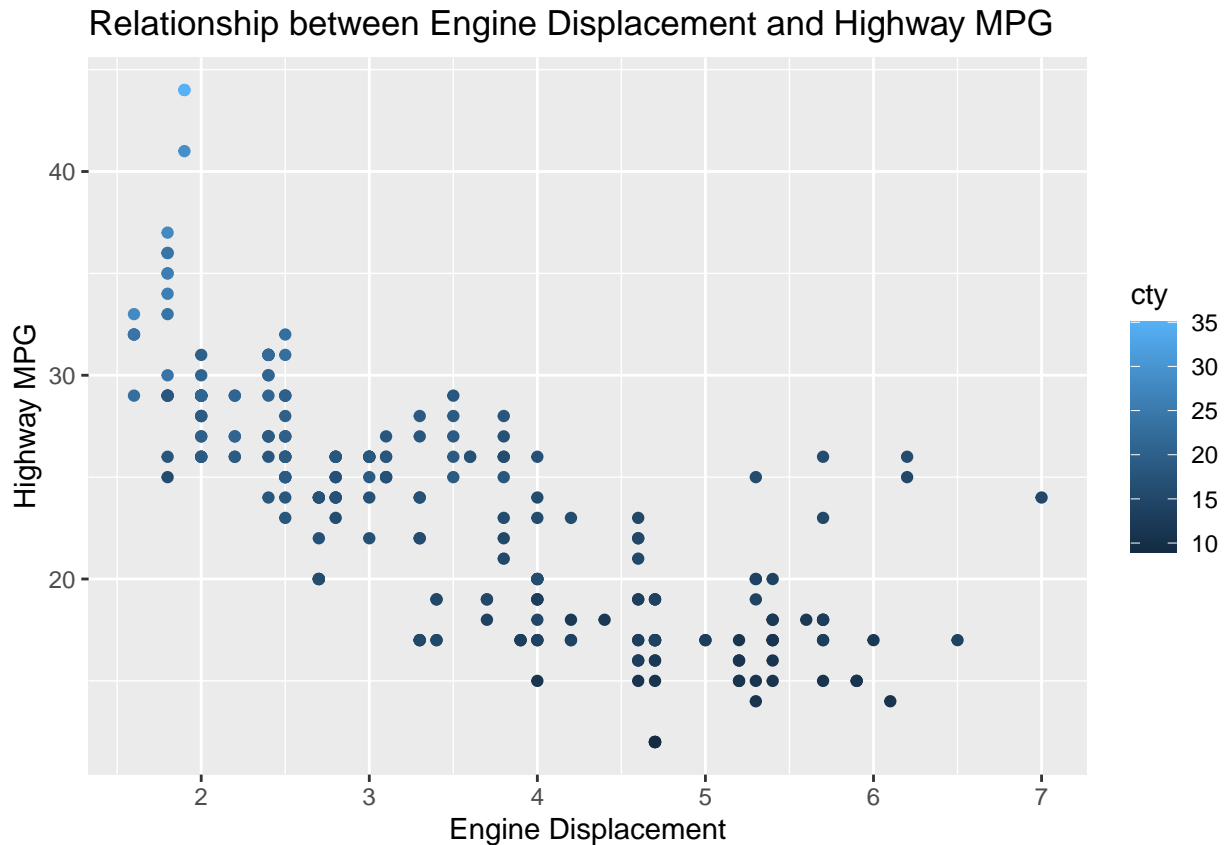
*# It generates a scatter plot illustrating the connection between cylinder count and engine displacement.*

*# As the number of cylinders increases, so does the displacement of the engine. This shows that larger engines tend to have more cylinders.*

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

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

```
displ_hwy_rel
```



*# Each point in the scatterplot represents a city's fuel efficiency, and it displays the relationship b*

6. Import the traffic.csv onto your R environment.

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

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

```
num_obs <- nrow(trafficFile)
num_obs
```

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

```
num_vars <- ncol(trafficFile)
num_vars
```

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

```
vars <- colnames(trafficFile)
vars
```

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

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

```
subset1_junctions <- subset(trafficFile, Junction == 1)
```

```
subset2_junctions <- subset(trafficFile, Junction == 2)
```



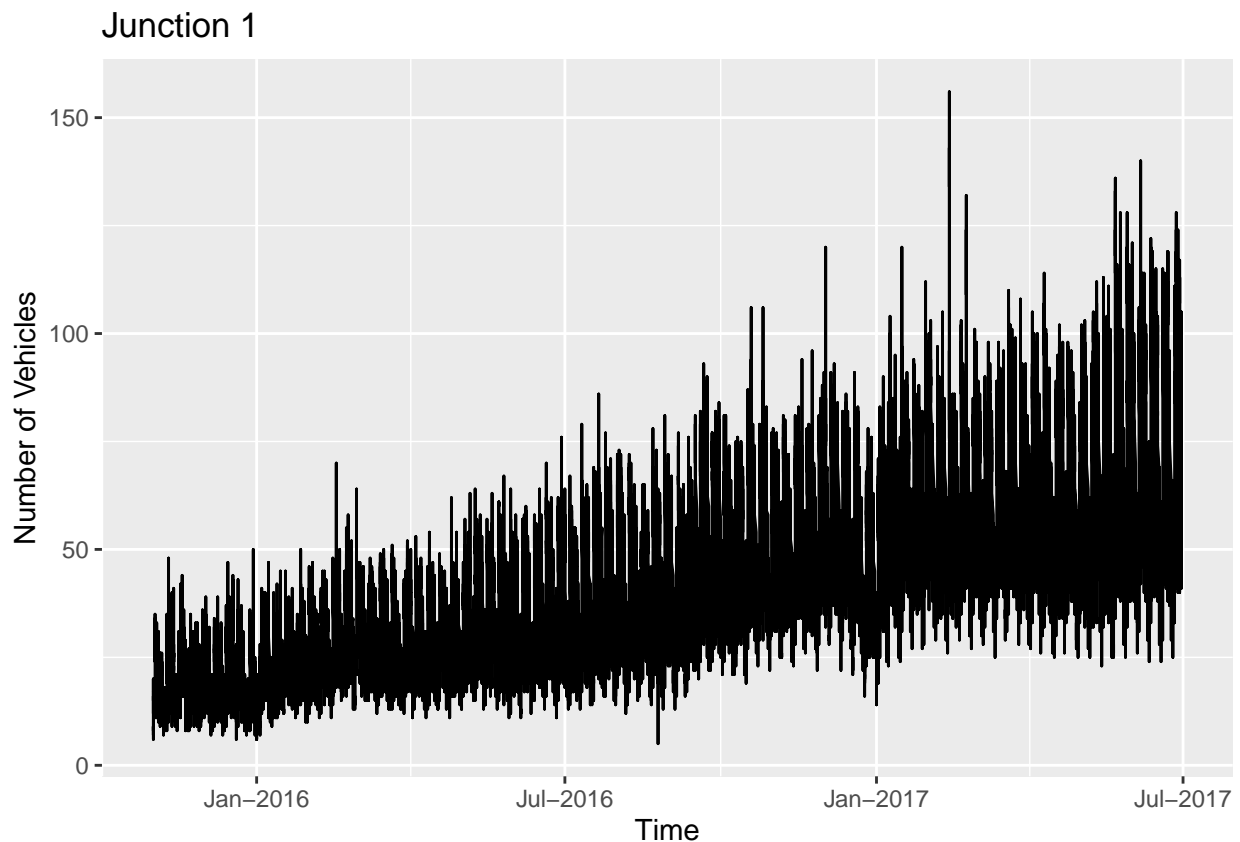
```
subset3_junctions <- subset(trafficFile, Junction == 3)

subset4_junctions <- subset(trafficFile, Junction == 4)
```

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

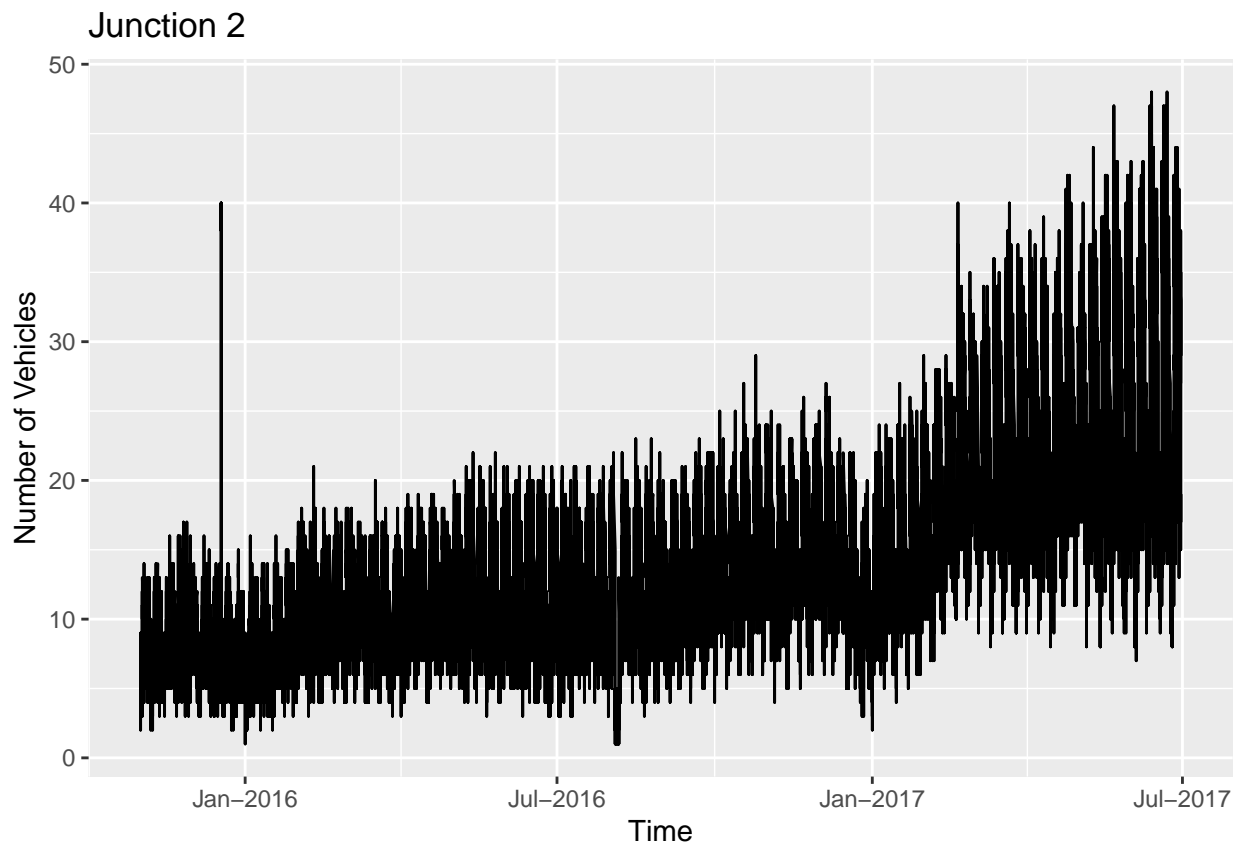
```
junction1_plot <- ggplot(subset1_junctions, aes(x = as.Date(DateTime), y = Vehicles)) +
  geom_line() +
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
  labs(title = "Junction 1", x = "Time", y = "Number of Vehicles")

junction1_plot
```



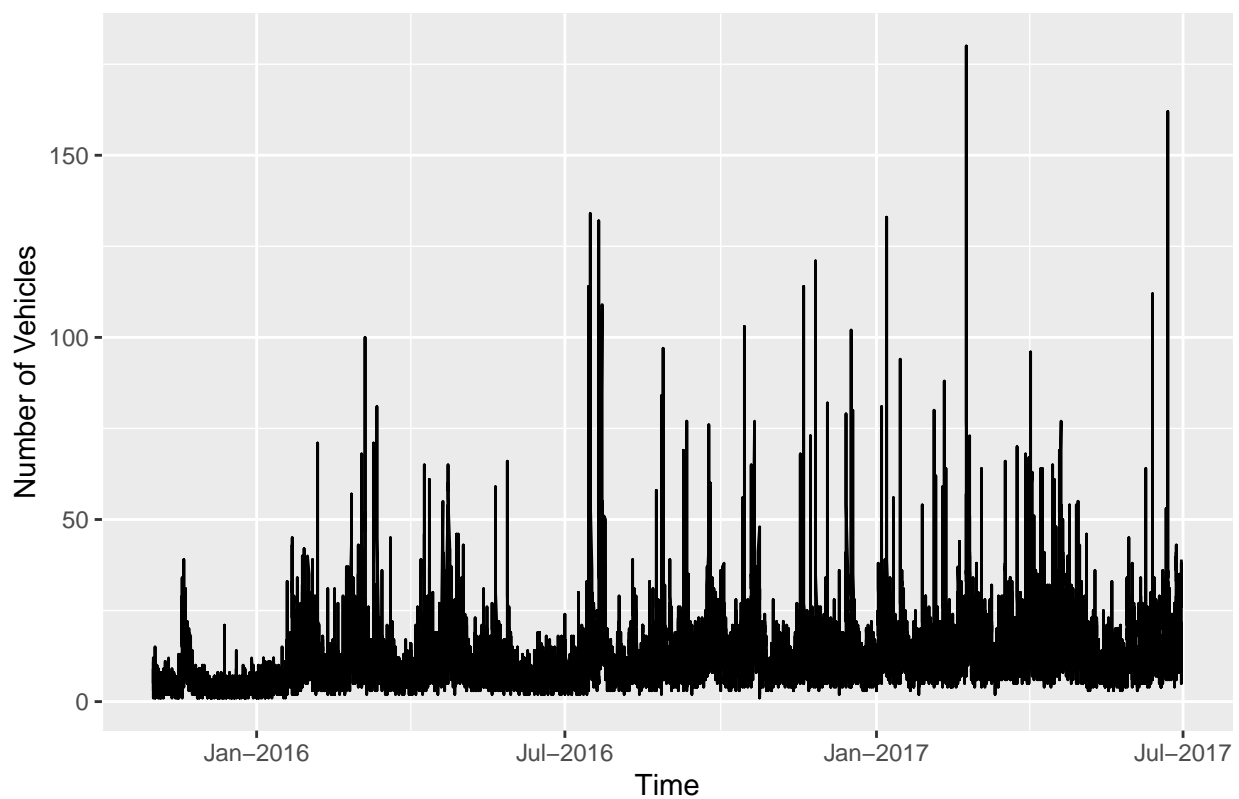
```
junction2_plot <- ggplot(subset2_junctions, aes(x = as.Date(subset2_junctions$DateTime), y = Vehicles))
  geom_line() +
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
  labs(title = "Junction 2", x = "Time", y = "Number of Vehicles")

junction2_plot
```



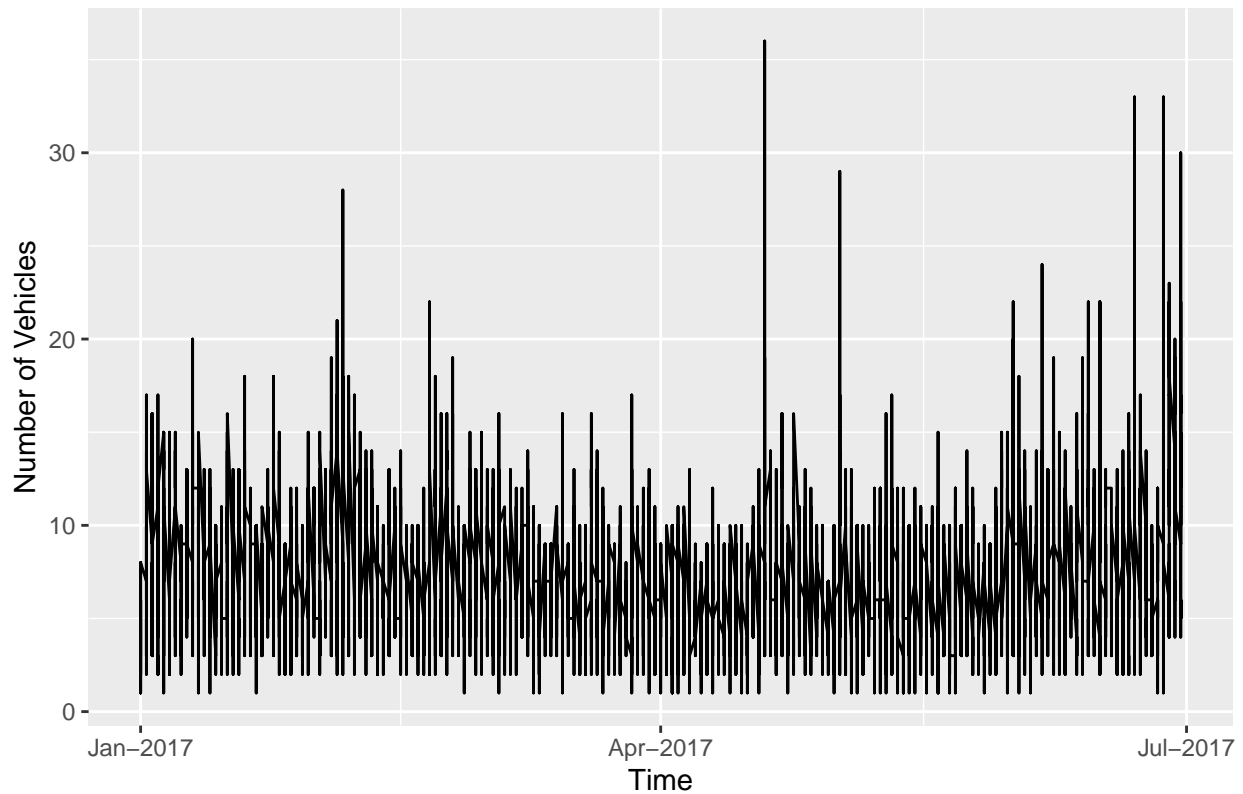
```
junction3_plot <- ggplot(subset3_junctions, aes(x = as.Date(subset3_junctions$DateTime), y = Vehicles))  
  geom_line() +  
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +  
  labs(title = "Junction 3", x = "Time", y = "Number of Vehicles")  
  
junction3_plot
```

Junction 3



```
junction4_plot <- ggplot(subset4_junctions, aes(x = as.Date(subset4_junctions$DateTime), y = Vehicles))  
  geom_line() +  
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +  
  labs(title = "Junction 4", x = "Time", y = "Number of Vehicles")  
  
junction4_plot
```

## Junction 4



7. From alexa\_file.xlsx, import it to your environment

a. How many observations does alexa\_file has? What about the number of columns? Show your solution and answer.

```
library(readxl)

alexaFile <- read_excel("/cloud/project/worksheet#4/worksheet4c/alexa_file.xlsx")

alexa_obs <- nrow(alexaFile)
alexa_obs

## [1] 3150

alexa_cols <- ncol(alexaFile)
alexa_cols

## [1] 5
```

b. group the variations and get the total of each variations. Use dplyr package. Show solution and answer.

```
var_total <- alexaFile %>%
  count(variation)

var_total

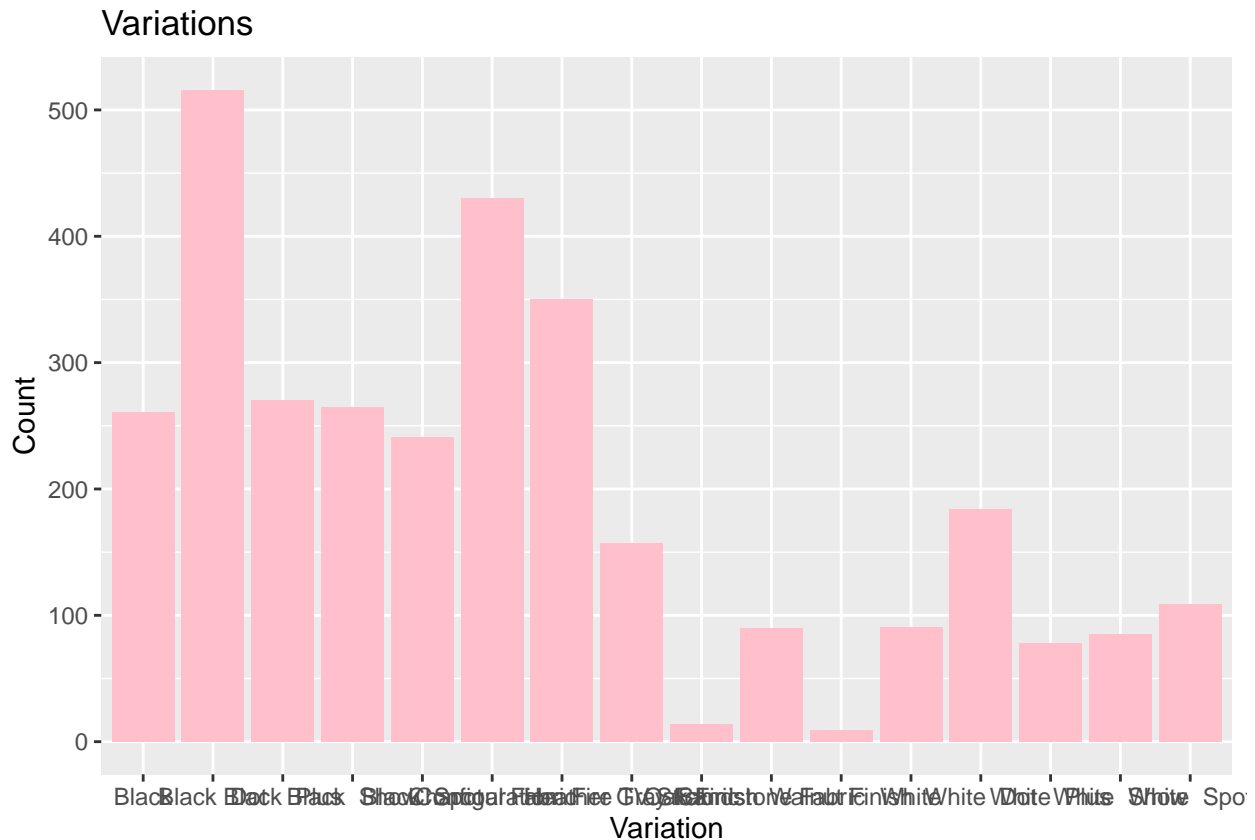
## # A tibble: 16 x 2
##   variation          n
##   <chr>          <int>
## 1 Black          261
```

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

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

```
plot_alexa <- ggplot(alexaFile, aes(x = variation)) +
  geom_bar(fill = "pink") +
  labs(title = "Variations",
       x = "Variation",
       y = "Count")
```

plot\_alexa



*# The graph illustrates the distribution of variations and their counts, with each bar indicating a dif*

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

```
library(dplyr)

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

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

alexa_month <- alexaFile %>%
  count(month)
alexa_month

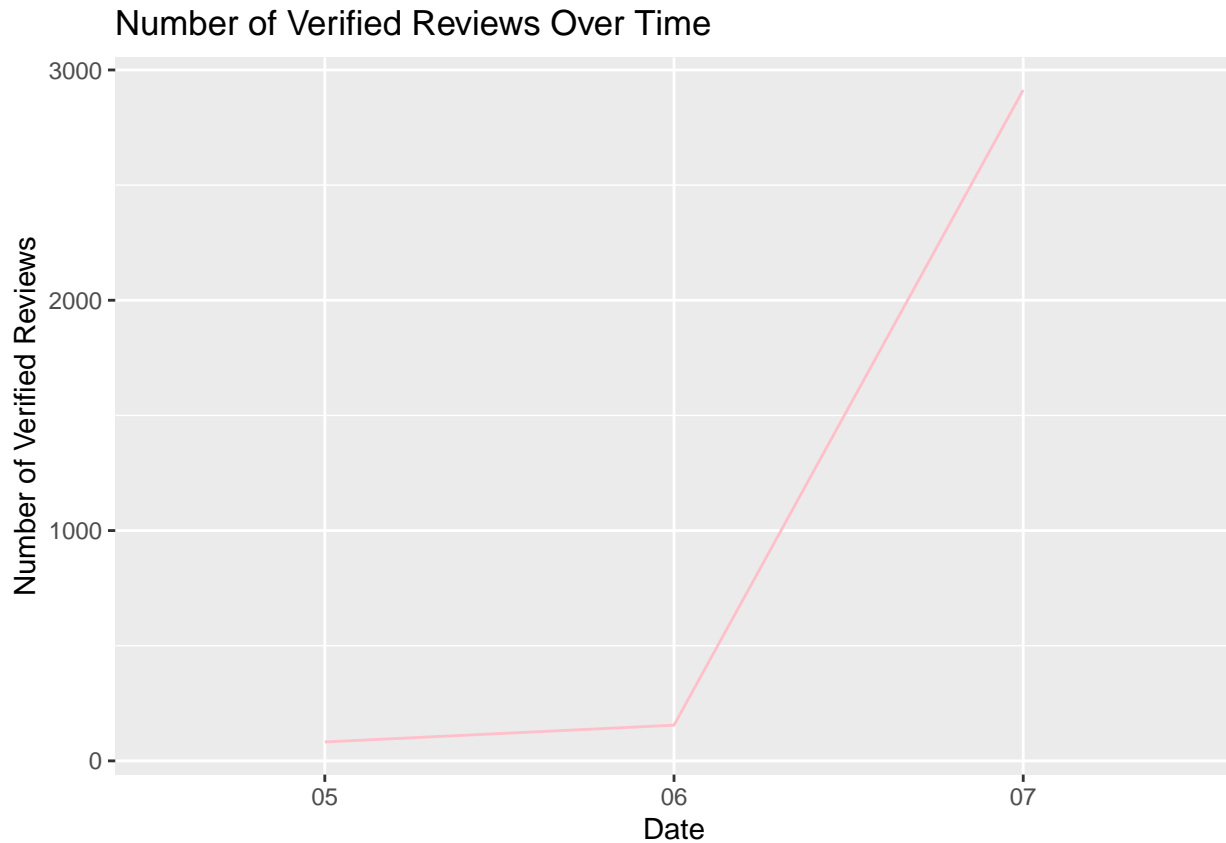
## # A tibble: 3 x 2
##   month     n
##   <chr> <int>
## 1 05      82
## 2 06     155
## 3 07    2913

alexa_rev <- table(alexa_month)
alexa_rev

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

gline_alexa <- ggplot(alexa_month, aes(x = month, y = n, group = 1)) +
  geom_line(color = "pink") +
  labs(title = "Number of Verified Reviews Over Time",
       x = "Date",
       y = "Number of Verified Reviews")

gline_alexa
```



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

```
alex_vars_ratings <- alexaFile %>%
  group_by(variation) %>%
  summarise(avg_rating = mean(rating))
```

```
alex_vars_ratings
```

```
## # A tibble: 16 x 2
##   variation          avg_rating
##   <chr>             <dbl>
## 1 Black             4.23
## 2 Black Dot         4.45
## 3 Black Plus        4.37
## 4 Black Show        4.49
## 5 Black Spot        4.31
## 6 Charcoal Fabric   4.73
## 7 Configuration: Fire TV Stick 4.59
## 8 Heather Gray Fabric 4.69
## 9 Oak Finish        4.86
## 10 Sandstone Fabric  4.36
## 11 Walnut Finish     4.89
## 12 White             4.14
## 13 White Dot         4.42
## 14 White Plus        4.36
## 15 White Show        4.28
## 16 White Spot        4.31
```

```
highest_ratings <- alexa_vars_ratings %>%
  filter(avg_rating == max(avg_rating))
```

```
highest_ratings
```

```
## # A tibble: 1 x 2
##   variation    avg_rating
##   <chr>        <dbl>
## 1 Walnut Finish    4.89
```

```
# The walnut finish variation has the highest rating
```

```
ggplot(alexa_vars_ratings, aes(x = variation, y = avg_rating)) +
  geom_bar(stat = "identity", fill = "pink") +
  labs(title = "Average Ratings by Variation",
       x = "Variation",
       y = "Average Rating")
```

