

RWorksheet_Obas#4c

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

```
mpg <- read.csv(file= "mpg.csv")
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(13)	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

```

#1.b Which variables from mpg dataset are categorical?

```
mpg_Var <- names(sapply(mpg, function(x) is.factor(x) || is.character(x)))
mpg_Var
```

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

The variables from mpg dataset are categorical are manufacturer, model, displ, year, cyl, trans, drv, cty, hwy, fl, class

#1.c Which are continuous variables?

```
continous <- sapply(mpg, is.numeric)
cont_vars <- names(mpg)[continous]
cont_vars
```

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

The continuous variables are displ, year, cyl, cty, and hwy

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

```
library(dplyr)
```

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

```
mostmodels_man <- mpg %>%
  group_by(manufacturer) %>%
  summarise(num_models = n_distinct(model)) %>%
  arrange(desc(num_models)) %>%
  head(1)
```

```
mostmodels_var <- mpg %>%
  group_by(model) %>%
  summarise(num_var = n()) %>%
  arrange(desc(num_var)) %>%
  head(1)
```

```
cat("Manufacturer with the most models:", mostmodels_man $manufacturer, "\n")
```

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

```
cat("Model with the most variations:", mostmodels_var$model, "\n")
```

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

```
#Manufacturer with the most models is toyota  
#Model with the most variations is caravan 2wd
```

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

```
library(dplyr)
```

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

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

## 45	dodge	caravan 2wd
## 46	dodge	caravan 2wd
## 47	dodge	caravan 2wd
## 48	dodge	caravan 2wd
## 49	dodge	dakota pickup 4wd
## 50	dodge	dakota pickup 4wd
## 51	dodge	dakota pickup 4wd
## 52	dodge	dakota pickup 4wd
## 53	dodge	dakota pickup 4wd
## 54	dodge	dakota pickup 4wd
## 55	dodge	dakota pickup 4wd
## 56	dodge	dakota pickup 4wd
## 57	dodge	dakota pickup 4wd
## 58	dodge	durango 4wd
## 59	dodge	durango 4wd
## 60	dodge	durango 4wd
## 61	dodge	durango 4wd
## 62	dodge	durango 4wd
## 63	dodge	durango 4wd
## 64	dodge	durango 4wd
## 65	dodge	ram 1500 pickup 4wd
## 66	dodge	ram 1500 pickup 4wd
## 67	dodge	ram 1500 pickup 4wd
## 68	dodge	ram 1500 pickup 4wd
## 69	dodge	ram 1500 pickup 4wd
## 70	dodge	ram 1500 pickup 4wd
## 71	dodge	ram 1500 pickup 4wd
## 72	dodge	ram 1500 pickup 4wd
## 73	dodge	ram 1500 pickup 4wd
## 74	dodge	ram 1500 pickup 4wd
## 75	ford	expedition 2wd
## 76	ford	expedition 2wd
## 77	ford	expedition 2wd
## 78	ford	explorer 4wd
## 79	ford	explorer 4wd
## 80	ford	explorer 4wd
## 81	ford	explorer 4wd
## 82	ford	explorer 4wd
## 83	ford	explorer 4wd
## 84	ford	f150 pickup 4wd
## 85	ford	f150 pickup 4wd
## 86	ford	f150 pickup 4wd
## 87	ford	f150 pickup 4wd
## 88	ford	f150 pickup 4wd
## 89	ford	f150 pickup 4wd
## 90	ford	f150 pickup 4wd
## 91	ford	mustang
## 92	ford	mustang
## 93	ford	mustang
## 94	ford	mustang
## 95	ford	mustang
## 96	ford	mustang
## 97	ford	mustang
## 98	ford	mustang

## 99	ford	mustang
## 100	honda	civic
## 101	honda	civic
## 102	honda	civic
## 103	honda	civic
## 104	honda	civic
## 105	honda	civic
## 106	honda	civic
## 107	honda	civic
## 108	honda	civic
## 109	hyundai	sonata
## 110	hyundai	sonata
## 111	hyundai	sonata
## 112	hyundai	sonata
## 113	hyundai	sonata
## 114	hyundai	sonata
## 115	hyundai	sonata
## 116	hyundai	tiburon
## 117	hyundai	tiburon
## 118	hyundai	tiburon
## 119	hyundai	tiburon
## 120	hyundai	tiburon
## 121	hyundai	tiburon
## 122	hyundai	tiburon
## 123	jeep	grand cherokee 4wd
## 124	jeep	grand cherokee 4wd
## 125	jeep	grand cherokee 4wd
## 126	jeep	grand cherokee 4wd
## 127	jeep	grand cherokee 4wd
## 128	jeep	grand cherokee 4wd
## 129	jeep	grand cherokee 4wd
## 130	jeep	grand cherokee 4wd
## 131	land rover	range rover
## 132	land rover	range rover
## 133	land rover	range rover
## 134	land rover	range rover
## 135	lincoln	navigator 2wd
## 136	lincoln	navigator 2wd
## 137	lincoln	navigator 2wd
## 138	mercury	mountaineer 4wd
## 139	mercury	mountaineer 4wd
## 140	mercury	mountaineer 4wd
## 141	mercury	mountaineer 4wd
## 142	nissan	altima
## 143	nissan	altima
## 144	nissan	altima
## 145	nissan	altima
## 146	nissan	altima
## 147	nissan	altima
## 148	nissan	maxima
## 149	nissan	maxima
## 150	nissan	maxima
## 151	nissan	pathfinder 4wd
## 152	nissan	pathfinder 4wd

## 153	nissan	pathfinder 4wd
## 154	nissan	pathfinder 4wd
## 155	pontiac	grand prix
## 156	pontiac	grand prix
## 157	pontiac	grand prix
## 158	pontiac	grand prix
## 159	pontiac	grand prix
## 160	subaru	forester awd
## 161	subaru	forester awd
## 162	subaru	forester awd
## 163	subaru	forester awd
## 164	subaru	forester awd
## 165	subaru	forester awd
## 166	subaru	impreza awd
## 167	subaru	impreza awd
## 168	subaru	impreza awd
## 169	subaru	impreza awd
## 170	subaru	impreza awd
## 171	subaru	impreza awd
## 172	subaru	impreza awd
## 173	subaru	impreza awd
## 174	toyota	4runner 4wd
## 175	toyota	4runner 4wd
## 176	toyota	4runner 4wd
## 177	toyota	4runner 4wd
## 178	toyota	4runner 4wd
## 179	toyota	4runner 4wd
## 180	toyota	camry
## 181	toyota	camry
## 182	toyota	camry
## 183	toyota	camry
## 184	toyota	camry
## 185	toyota	camry
## 186	toyota	camry
## 187	toyota	camry solara
## 188	toyota	camry solara
## 189	toyota	camry solara
## 190	toyota	camry solara
## 191	toyota	camry solara
## 192	toyota	camry solara
## 193	toyota	camry solara
## 194	toyota	corolla
## 195	toyota	corolla
## 196	toyota	corolla
## 197	toyota	corolla
## 198	toyota	corolla
## 199	toyota land	cruiser wagon 4wd
## 200	toyota land	cruiser wagon 4wd
## 201	toyota	toyota tacoma 4wd
## 202	toyota	toyota tacoma 4wd
## 203	toyota	toyota tacoma 4wd
## 204	toyota	toyota tacoma 4wd
## 205	toyota	toyota tacoma 4wd
## 206	toyota	toyota tacoma 4wd

```
## 207      toyota      toyota tacoma 4wd
## 208 volkswagen      gti
## 209 volkswagen      gti
## 210 volkswagen      gti
## 211 volkswagen      gti
## 212 volkswagen      gti
## 213 volkswagen      jetta
## 214 volkswagen      jetta
## 215 volkswagen      jetta
## 216 volkswagen      jetta
## 217 volkswagen      jetta
## 218 volkswagen      jetta
## 219 volkswagen      jetta
## 220 volkswagen      jetta
## 221 volkswagen      jetta
## 222 volkswagen      new beetle
## 223 volkswagen      new beetle
## 224 volkswagen      new beetle
## 225 volkswagen      new beetle
## 226 volkswagen      new beetle
## 227 volkswagen      new beetle
## 228 volkswagen      passat
## 229 volkswagen      passat
## 230 volkswagen      passat
## 231 volkswagen      passat
## 232 volkswagen      passat
## 233 volkswagen      passat
## 234 volkswagen      passat
```

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

```
##      Manufacturer      Model
## 1      audi      a4
## 8      audi      a4 quattro
## 16     audi      a6 quattro
## 19     chevrolet    c1500 suburban 2wd
## 24     chevrolet    corvette
## 29     chevrolet    k1500 tahoe 4wd
## 33     chevrolet    malibu
## 38     dodge      caravan 2wd
## 49     dodge      dakota pickup 4wd
## 58     dodge      durango 4wd
## 65     dodge      ram 1500 pickup 4wd
## 75     ford      expedition 2wd
## 78     ford      explorer 4wd
## 84     ford      f150 pickup 4wd
## 91     ford      mustang
## 100    honda      civic
## 109    hyundai     sonata
## 116    hyundai     tiburon
## 123    jeep      grand cherokee 4wd
## 131    land rover  range rover
## 135    lincoln     navigator 2wd
## 138    mercury     mountaineer 4wd
```

```
## 142      nissan      altima
## 148      nissan      maxima
## 151      nissan      pathfinder 4wd
## 155      pontiac      grand prix
## 160      subaru      forester awd
## 166      subaru      impreza awd
## 174      toyota      4runner 4wd
## 180      toyota      camry
## 187      toyota      camry solara
## 194      toyota      corolla
## 199      toyota land cruiser wagon 4wd
## 201      toyota      toyota tacoma 4wd
## 208      volkswagen      gti
## 213      volkswagen      jetta
## 222      volkswagen      new beetle
## 228      volkswagen      passat
```

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

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

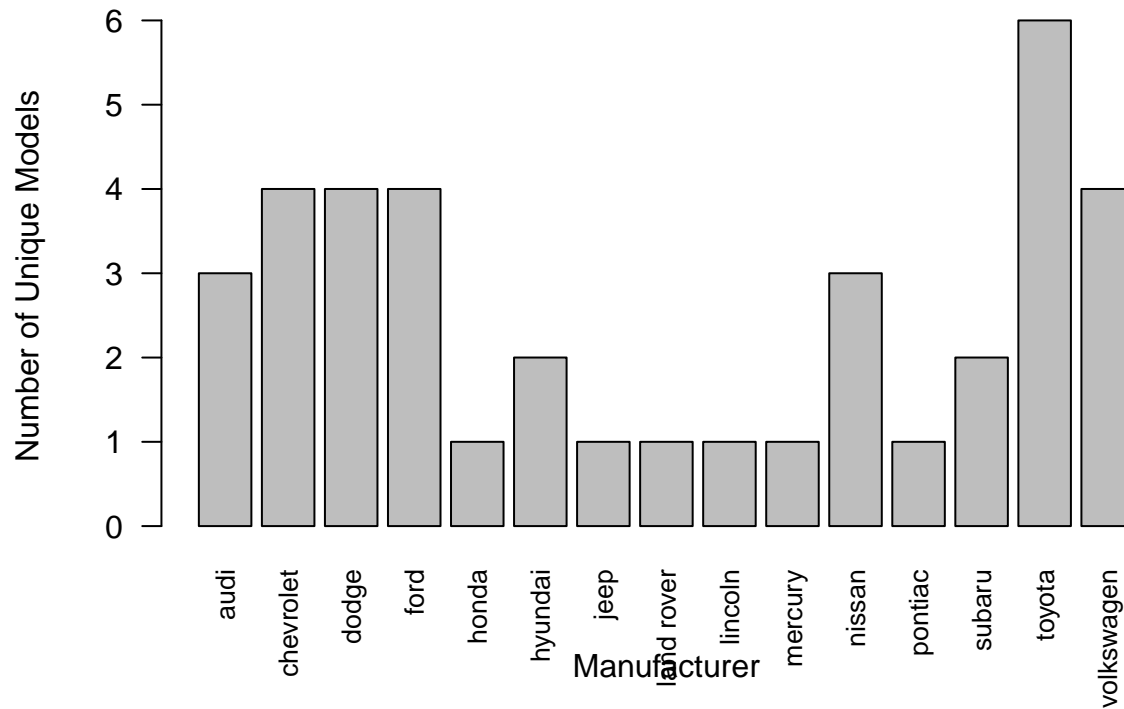
```
library(ggplot2)
```

```
##
## Attaching package: 'ggplot2'
## The following object is masked _by_ '.GlobalEnv':
##
##      mpg
```

```
library(dplyr)
```

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

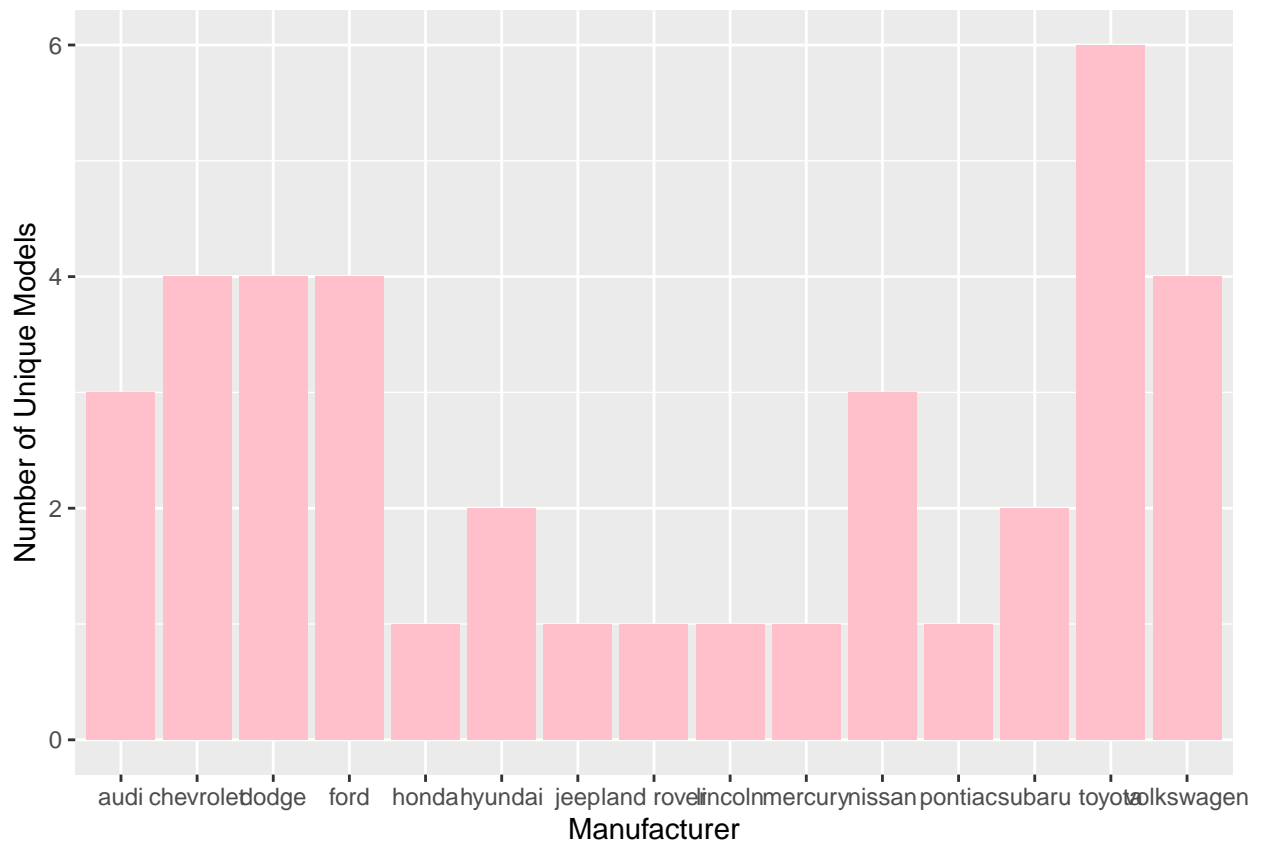

Unique Models of Manufacturers



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

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

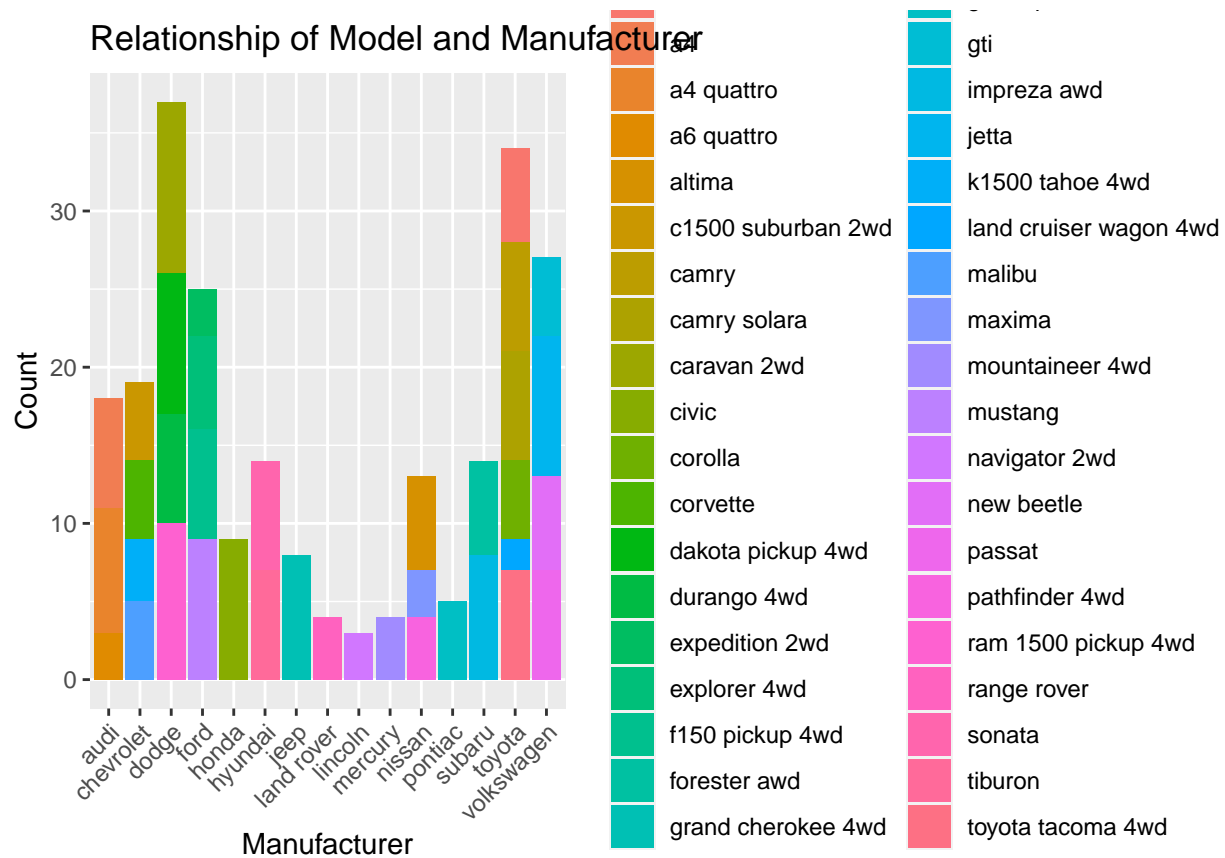
```
ggplot(uniqueCount, aes(x = `uniqueMods$Manufacturer`, y = n)) +
  geom_bar(stat = "identity", fill = "pink") +
  labs(x = "Manufacturer", y = "Number of Unique Models")
```



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

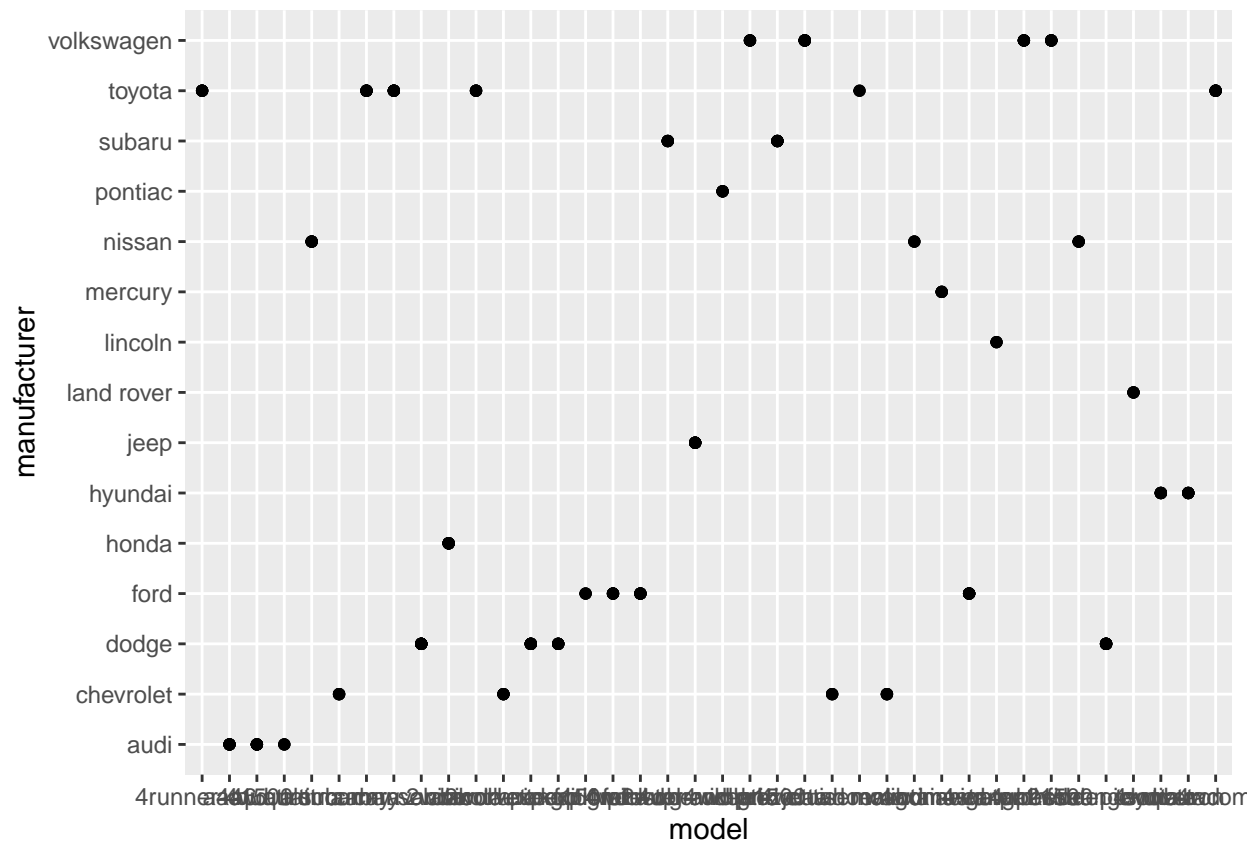
```
library(ggplot2)
```

```
ggplot(mpg, aes(x = manufacturer, fill = model)) +
  geom_bar() +
  labs(title = "Relationship of Model and Manufacturer",
       x = "Manufacturer",
       y = "Count",
       fill = "Model") +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```



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

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

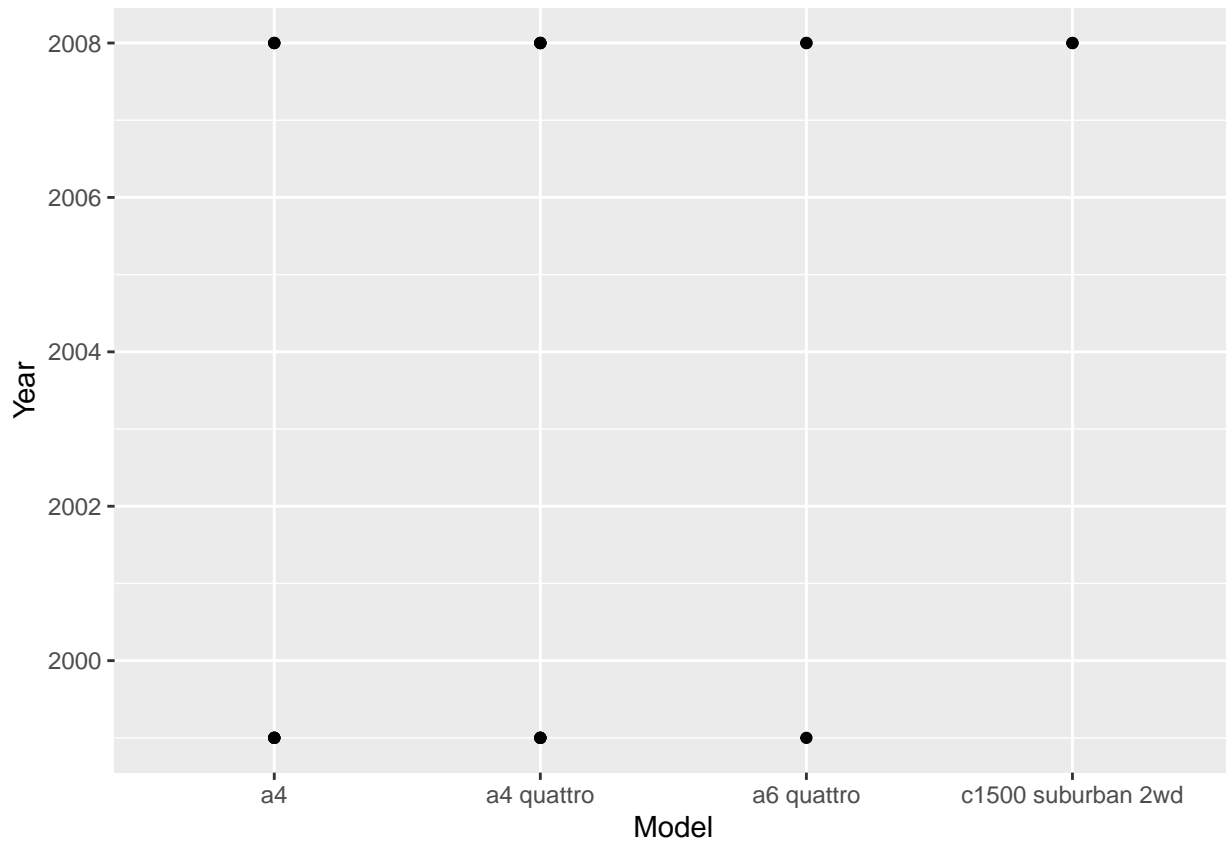


#The "model" variable is represented by the x-axis. The variable "manufacturer" is represented by the y

#To add points to the plot, utilize the geom_point() method. You will see a point for every combination

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

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

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

```
library(dplyr)
```

```
modelCarCount <- mpg %>%
  group_by(model) %>%
  summarize(numberOfCars = n())
```

```
modelCarCount
```

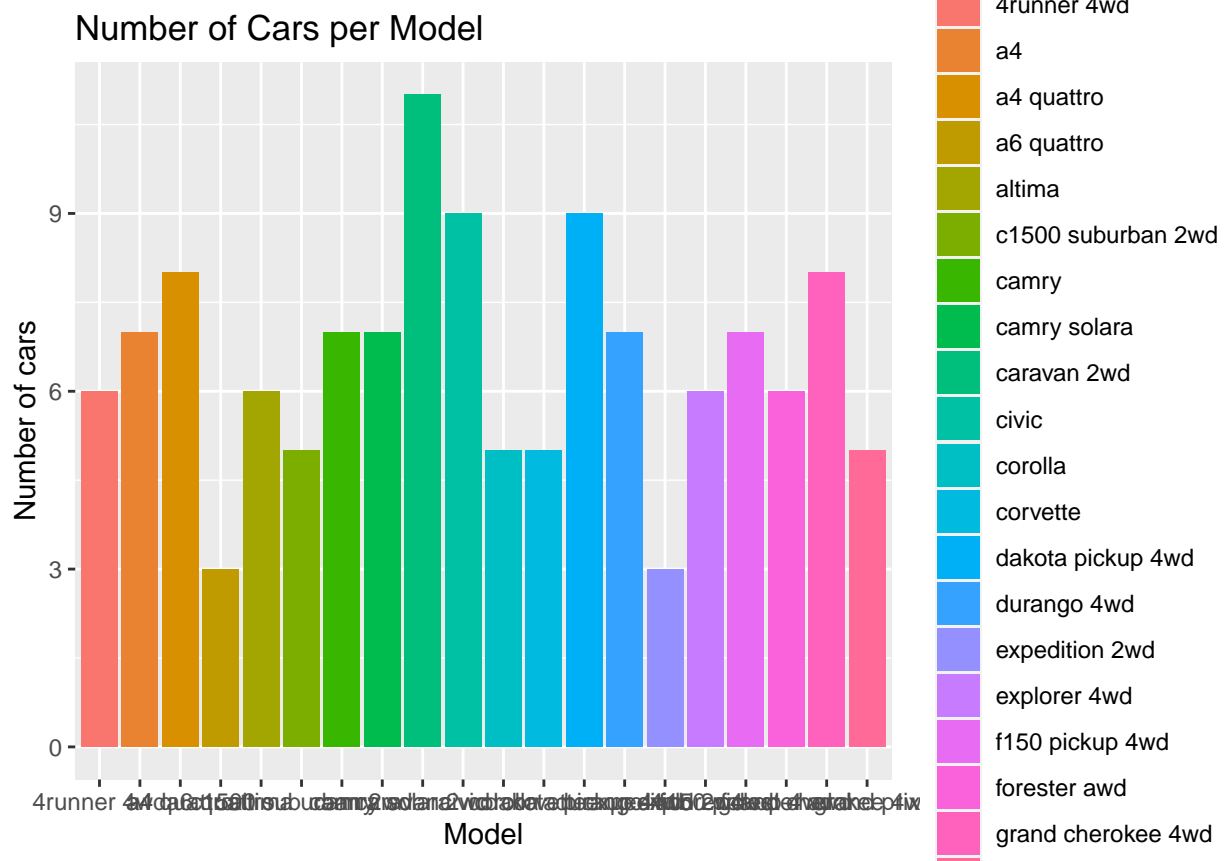
```
## # A tibble: 38 x 2
##   model          numberOfCars
##   <chr>             <int>
## 1 4runner 4wd             6
## 2 a4                     7
## 3 a4 quattro             8
## 4 a6 quattro             3
## 5 altima                 6
## 6 c1500 suburban 2wd     5
## 7 camry                  7
##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

#4.a 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”.

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

```
top_20 <- ggplot(obs20, aes(x = model, y = numberOfCars, fill = model)) +  
  geom_bar(stat = "identity") +  
  labs(title = "Number of Cars per Model",  
        x = "Model" ,  
        y = "Number of cars")
```

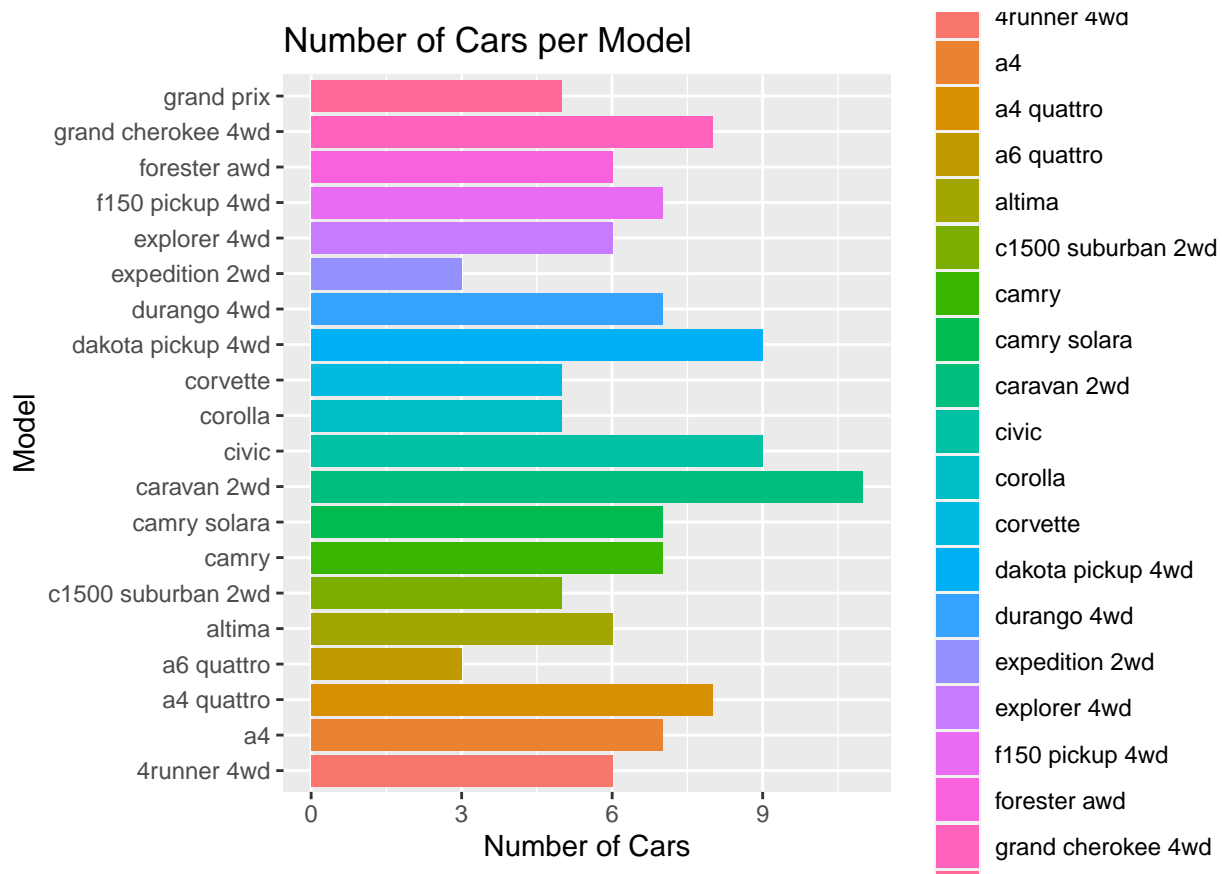
```
top_20
```



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

```
flippedTop20 <- ggplot(obs20, aes(x = model, y = numberOfCars, fill = model)) +  
  geom_bar(stat = "identity") + labs(title = "Number of Cars per Model", x = "Model" ,  
                                     y = "Number of Cars")+ coord_flip()
```

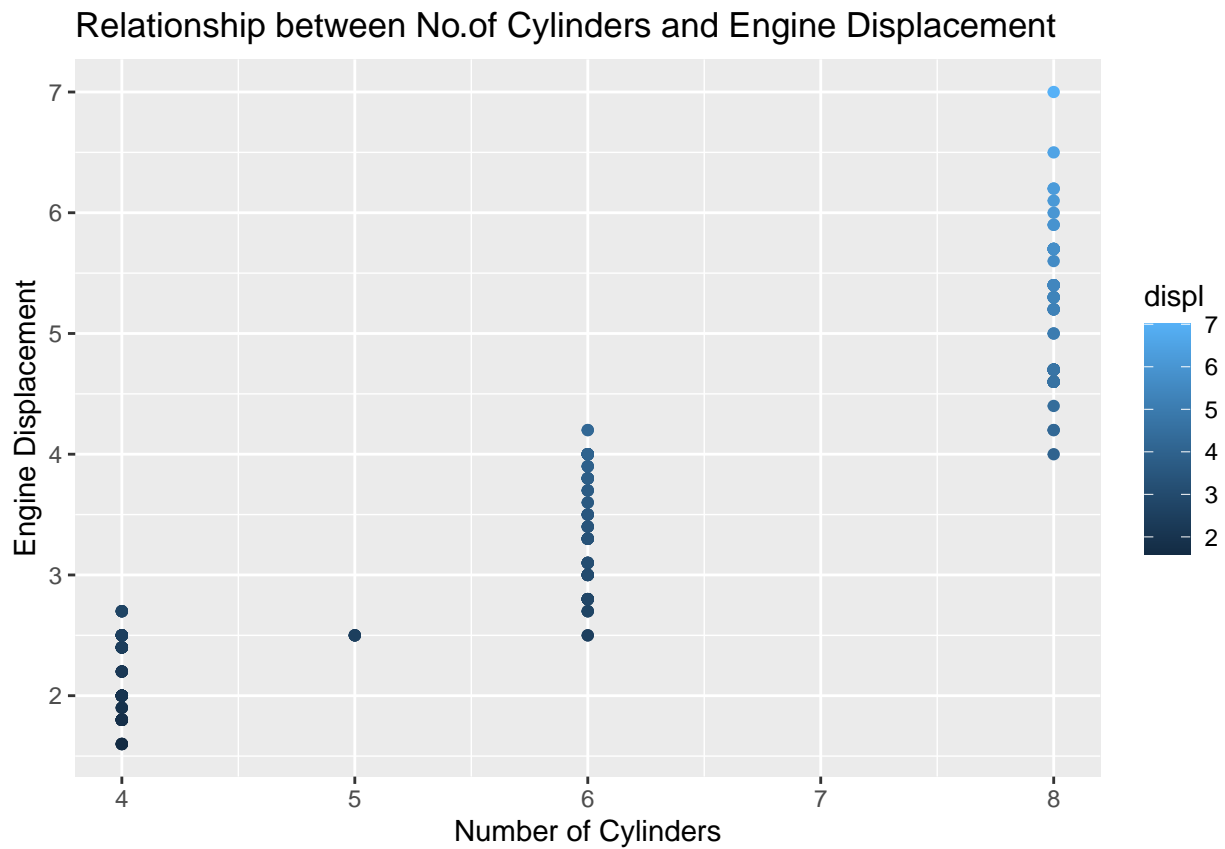
```
flippedTop20
```



#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".

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

```
cylDisplayPlot
```

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

#This will produce a scatter plot illustrating how the number of cylinders relates to engine displacement.

#As cylinder count rises, engine displacement generally follows suit. This indicates a trend where larger engines have more cylinders.