

RWorksheet#4C

2023-11-21

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

##	X	manufacturer	model	displ	year	cyl	trans	drv	cty
## 1	1	audi	a4	1.8	1999	4	auto(l5)	f	18
## 2	2	audi	a4	1.8	1999	4	manual(m5)	f	21
## 3	3	audi	a4	2.0	2008	4	manual(m6)	f	20
## 4	4	audi	a4	2.0	2008	4	auto(av)	f	21
## 5	5	audi	a4	2.8	1999	6	auto(l5)	f	16
## 6	6	audi	a4	2.8	1999	6	manual(m5)	f	18
## 7	7	audi	a4	3.1	2008	6	auto(av)	f	18
## 8	8	audi	a4 quattro	1.8	1999	4	manual(m5)	4	18
## 9	9	audi	a4 quattro	1.8	1999	4	auto(l5)	4	16
## 10	10	audi	a4 quattro	2.0	2008	4	manual(m6)	4	20
## 11	11	audi	a4 quattro	2.0	2008	4	auto(s6)	4	19
## 12	12	audi	a4 quattro	2.8	1999	6	auto(l5)	4	15
## 13	13	audi	a4 quattro	2.8	1999	6	manual(m5)	4	17
## 14	14	audi	a4 quattro	3.1	2008	6	auto(s6)	4	17
## 15	15	audi	a4 quattro	3.1	2008	6	manual(m6)	4	15
## 16	16	audi	a6 quattro	2.8	1999	6	auto(l5)	4	15
## 17	17	audi	a6 quattro	3.1	2008	6	auto(s6)	4	17
## 18	18	audi	a6 quattro	4.2	2008	8	auto(s6)	4	16
## 19	19	chevrolet	c1500 suburban 2wd	5.3	2008	8	auto(l4)	r	14
## 20	20	chevrolet	c1500 suburban 2wd	5.3	2008	8	auto(l4)	r	11
## 21	21	chevrolet	c1500 suburban 2wd	5.3	2008	8	auto(l4)	r	14
## 22	22	chevrolet	c1500 suburban 2wd	5.7	1999	8	auto(l4)	r	13
## 23	23	chevrolet	c1500 suburban 2wd	6.0	2008	8	auto(l4)	r	12
## 24	24	chevrolet	corvette	5.7	1999	8	manual(m6)	r	16
## 25	25	chevrolet	corvette	5.7	1999	8	auto(l4)	r	15
## 26	26	chevrolet	corvette	6.2	2008	8	manual(m6)	r	16
## 27	27	chevrolet	corvette	6.2	2008	8	auto(s6)	r	15
## 28	28	chevrolet	corvette	7.0	2008	8	manual(m6)	r	15
## 29	29	chevrolet	k1500 tahoe 4wd	5.3	2008	8	auto(l4)	4	14
## 30	30	chevrolet	k1500 tahoe 4wd	5.3	2008	8	auto(l4)	4	11
## 31	31	chevrolet	k1500 tahoe 4wd	5.7	1999	8	auto(l4)	4	11
## 32	32	chevrolet	k1500 tahoe 4wd	6.5	1999	8	auto(l4)	4	14
## 33	33	chevrolet	malibu	2.4	1999	4	auto(l4)	f	19
## 34	34	chevrolet	malibu	2.4	2008	4	auto(l4)	f	22
## 35	35	chevrolet	malibu	3.1	1999	6	auto(l4)	f	18
## 36	36	chevrolet	malibu	3.5	2008	6	auto(l4)	f	18
## 37	37	chevrolet	malibu	3.6	2008	6	auto(s6)	f	17
## 38	38	dodge	caravan 2wd	2.4	1999	4	auto(l3)	f	18
## 39	39	dodge	caravan 2wd	3.0	1999	6	auto(l4)	f	17
## 40	40	dodge	caravan 2wd	3.3	1999	6	auto(l4)	f	16

## 41	41	dodge	caravan	2wd	3.3	1999	6	auto(14)	f	16
## 42	42	dodge	caravan	2wd	3.3	2008	6	auto(14)	f	17
## 43	43	dodge	caravan	2wd	3.3	2008	6	auto(14)	f	17
## 44	44	dodge	caravan	2wd	3.3	2008	6	auto(14)	f	11
## 45	45	dodge	caravan	2wd	3.8	1999	6	auto(14)	f	15
## 46	46	dodge	caravan	2wd	3.8	1999	6	auto(14)	f	15
## 47	47	dodge	caravan	2wd	3.8	2008	6	auto(16)	f	16
## 48	48	dodge	caravan	2wd	4.0	2008	6	auto(16)	f	16
## 49	49	dodge	dakota	pickup	4wd	3.7	2008	6 manual(m6)	4	15
## 50	50	dodge	dakota	pickup	4wd	3.7	2008	6 auto(14)	4	14
## 51	51	dodge	dakota	pickup	4wd	3.9	1999	6 auto(14)	4	13
## 52	52	dodge	dakota	pickup	4wd	3.9	1999	6 manual(m5)	4	14
## 53	53	dodge	dakota	pickup	4wd	4.7	2008	8 auto(15)	4	14
## 54	54	dodge	dakota	pickup	4wd	4.7	2008	8 auto(15)	4	14
## 55	55	dodge	dakota	pickup	4wd	4.7	2008	8 auto(15)	4	9
## 56	56	dodge	dakota	pickup	4wd	5.2	1999	8 manual(m5)	4	11
## 57	57	dodge	dakota	pickup	4wd	5.2	1999	8 auto(14)	4	11
## 58	58	dodge	durango	4wd	3.9	1999	6 auto(14)	4	13	
## 59	59	dodge	durango	4wd	4.7	2008	8 auto(15)	4	13	
## 60	60	dodge	durango	4wd	4.7	2008	8 auto(15)	4	9	
## 61	61	dodge	durango	4wd	4.7	2008	8 auto(15)	4	13	
## 62	62	dodge	durango	4wd	5.2	1999	8 auto(14)	4	11	
## 63	63	dodge	durango	4wd	5.7	2008	8 auto(15)	4	13	
## 64	64	dodge	durango	4wd	5.9	1999	8 auto(14)	4	11	
## 65	65	dodge	ram	1500 pickup	4wd	4.7	2008	8 manual(m6)	4	12
## 66	66	dodge	ram	1500 pickup	4wd	4.7	2008	8 auto(15)	4	9
## 67	67	dodge	ram	1500 pickup	4wd	4.7	2008	8 auto(15)	4	13
## 68	68	dodge	ram	1500 pickup	4wd	4.7	2008	8 auto(15)	4	13
## 69	69	dodge	ram	1500 pickup	4wd	4.7	2008	8 manual(m6)	4	12
## 70	70	dodge	ram	1500 pickup	4wd	4.7	2008	8 manual(m6)	4	9
## 71	71	dodge	ram	1500 pickup	4wd	5.2	1999	8 auto(14)	4	11
## 72	72	dodge	ram	1500 pickup	4wd	5.2	1999	8 manual(m5)	4	11
## 73	73	dodge	ram	1500 pickup	4wd	5.7	2008	8 auto(15)	4	13
## 74	74	dodge	ram	1500 pickup	4wd	5.9	1999	8 auto(14)	4	11
## 75	75	ford	expedition	2wd	4.6	1999	8 auto(14)	r	11	
## 76	76	ford	expedition	2wd	5.4	1999	8 auto(14)	r	11	
## 77	77	ford	expedition	2wd	5.4	2008	8 auto(16)	r	12	
## 78	78	ford	explorer	4wd	4.0	1999	6 auto(15)	4	14	
## 79	79	ford	explorer	4wd	4.0	1999	6 manual(m5)	4	15	
## 80	80	ford	explorer	4wd	4.0	1999	6 auto(15)	4	14	
## 81	81	ford	explorer	4wd	4.0	2008	6 auto(15)	4	13	
## 82	82	ford	explorer	4wd	4.6	2008	8 auto(16)	4	13	
## 83	83	ford	explorer	4wd	5.0	1999	8 auto(14)	4	13	
## 84	84	ford	f150 pickup	4wd	4.2	1999	6 auto(14)	4	14	
## 85	85	ford	f150 pickup	4wd	4.2	1999	6 manual(m5)	4	14	
## 86	86	ford	f150 pickup	4wd	4.6	1999	8 manual(m5)	4	13	
## 87	87	ford	f150 pickup	4wd	4.6	1999	8 auto(14)	4	13	
## 88	88	ford	f150 pickup	4wd	4.6	2008	8 auto(14)	4	13	
## 89	89	ford	f150 pickup	4wd	5.4	1999	8 auto(14)	4	11	
## 90	90	ford	f150 pickup	4wd	5.4	2008	8 auto(14)	4	13	
## 91	91	ford	mustang		3.8	1999	6 manual(m5)	r	18	
## 92	92	ford	mustang		3.8	1999	6 auto(14)	r	18	
## 93	93	ford	mustang		4.0	2008	6 manual(m5)	r	17	
## 94	94	ford	mustang		4.0	2008	6 auto(15)	r	16	

## 95	95	ford	mustang	4.6	1999	8	auto(14)	r	15
## 96	96	ford	mustang	4.6	1999	8	manual(m5)	r	15
## 97	97	ford	mustang	4.6	2008	8	manual(m5)	r	15
## 98	98	ford	mustang	4.6	2008	8	auto(15)	r	15
## 99	99	ford	mustang	5.4	2008	8	manual(m6)	r	14
## 100	100	honda	civic	1.6	1999	4	manual(m5)	f	28
## 101	101	honda	civic	1.6	1999	4	auto(14)	f	24
## 102	102	honda	civic	1.6	1999	4	manual(m5)	f	25
## 103	103	honda	civic	1.6	1999	4	manual(m5)	f	23
## 104	104	honda	civic	1.6	1999	4	auto(14)	f	24
## 105	105	honda	civic	1.8	2008	4	manual(m5)	f	26
## 106	106	honda	civic	1.8	2008	4	auto(15)	f	25
## 107	107	honda	civic	1.8	2008	4	auto(15)	f	24
## 108	108	honda	civic	2.0	2008	4	manual(m6)	f	21
## 109	109	hyundai	sonata	2.4	1999	4	auto(14)	f	18
## 110	110	hyundai	sonata	2.4	1999	4	manual(m5)	f	18
## 111	111	hyundai	sonata	2.4	2008	4	auto(14)	f	21
## 112	112	hyundai	sonata	2.4	2008	4	manual(m5)	f	21
## 113	113	hyundai	sonata	2.5	1999	6	auto(14)	f	18
## 114	114	hyundai	sonata	2.5	1999	6	manual(m5)	f	18
## 115	115	hyundai	sonata	3.3	2008	6	auto(15)	f	19
## 116	116	hyundai	tiburon	2.0	1999	4	auto(14)	f	19
## 117	117	hyundai	tiburon	2.0	1999	4	manual(m5)	f	19
## 118	118	hyundai	tiburon	2.0	2008	4	manual(m5)	f	20
## 119	119	hyundai	tiburon	2.0	2008	4	auto(14)	f	20
## 120	120	hyundai	tiburon	2.7	2008	6	auto(14)	f	17
## 121	121	hyundai	tiburon	2.7	2008	6	manual(m6)	f	16
## 122	122	hyundai	tiburon	2.7	2008	6	manual(m5)	f	17
## 123	123	jeep	grand cherokee 4wd	3.0	2008	6	auto(15)	4	17
## 124	124	jeep	grand cherokee 4wd	3.7	2008	6	auto(15)	4	15
## 125	125	jeep	grand cherokee 4wd	4.0	1999	6	auto(14)	4	15
## 126	126	jeep	grand cherokee 4wd	4.7	1999	8	auto(14)	4	14
## 127	127	jeep	grand cherokee 4wd	4.7	2008	8	auto(15)	4	9
## 128	128	jeep	grand cherokee 4wd	4.7	2008	8	auto(15)	4	14
## 129	129	jeep	grand cherokee 4wd	5.7	2008	8	auto(15)	4	13
## 130	130	jeep	grand cherokee 4wd	6.1	2008	8	auto(15)	4	11
## 131	131	land rover	range rover	4.0	1999	8	auto(14)	4	11
## 132	132	land rover	range rover	4.2	2008	8	auto(s6)	4	12
## 133	133	land rover	range rover	4.4	2008	8	auto(s6)	4	12
## 134	134	land rover	range rover	4.6	1999	8	auto(14)	4	11
## 135	135	lincoln	navigator 2wd	5.4	1999	8	auto(14)	r	11
## 136	136	lincoln	navigator 2wd	5.4	1999	8	auto(14)	r	11
## 137	137	lincoln	navigator 2wd	5.4	2008	8	auto(16)	r	12
## 138	138	mercury	mountaineer 4wd	4.0	1999	6	auto(15)	4	14
## 139	139	mercury	mountaineer 4wd	4.0	2008	6	auto(15)	4	13
## 140	140	mercury	mountaineer 4wd	4.6	2008	8	auto(16)	4	13
## 141	141	mercury	mountaineer 4wd	5.0	1999	8	auto(14)	4	13
## 142	142	nissan	altima	2.4	1999	4	manual(m5)	f	21
## 143	143	nissan	altima	2.4	1999	4	auto(14)	f	19
## 144	144	nissan	altima	2.5	2008	4	auto(av)	f	23
## 145	145	nissan	altima	2.5	2008	4	manual(m6)	f	23
## 146	146	nissan	altima	3.5	2008	6	manual(m6)	f	19
## 147	147	nissan	altima	3.5	2008	6	auto(av)	f	19
## 148	148	nissan	maxima	3.0	1999	6	auto(14)	f	18

## 149	149	nissan	maxima	3.0	1999	6	manual(m5)	f	19
## 150	150	nissan	maxima	3.5	2008	6	auto(av)	f	19
## 151	151	nissan	pathfinder 4wd	3.3	1999	6	auto(14)	4	14
## 152	152	nissan	pathfinder 4wd	3.3	1999	6	manual(m5)	4	15
## 153	153	nissan	pathfinder 4wd	4.0	2008	6	auto(15)	4	14
## 154	154	nissan	pathfinder 4wd	5.6	2008	8	auto(s5)	4	12
## 155	155	pontiac	grand prix	3.1	1999	6	auto(14)	f	18
## 156	156	pontiac	grand prix	3.8	1999	6	auto(14)	f	16
## 157	157	pontiac	grand prix	3.8	1999	6	auto(14)	f	17
## 158	158	pontiac	grand prix	3.8	2008	6	auto(14)	f	18
## 159	159	pontiac	grand prix	5.3	2008	8	auto(s4)	f	16
## 160	160	subaru	forester awd	2.5	1999	4	manual(m5)	4	18
## 161	161	subaru	forester awd	2.5	1999	4	auto(14)	4	18
## 162	162	subaru	forester awd	2.5	2008	4	manual(m5)	4	20
## 163	163	subaru	forester awd	2.5	2008	4	manual(m5)	4	19
## 164	164	subaru	forester awd	2.5	2008	4	auto(14)	4	20
## 165	165	subaru	forester awd	2.5	2008	4	auto(14)	4	18
## 166	166	subaru	impreza awd	2.2	1999	4	auto(14)	4	21
## 167	167	subaru	impreza awd	2.2	1999	4	manual(m5)	4	19
## 168	168	subaru	impreza awd	2.5	1999	4	manual(m5)	4	19
## 169	169	subaru	impreza awd	2.5	1999	4	auto(14)	4	19
## 170	170	subaru	impreza awd	2.5	2008	4	auto(s4)	4	20
## 171	171	subaru	impreza awd	2.5	2008	4	auto(s4)	4	20
## 172	172	subaru	impreza awd	2.5	2008	4	manual(m5)	4	19
## 173	173	subaru	impreza awd	2.5	2008	4	manual(m5)	4	20
## 174	174	toyota	4runner 4wd	2.7	1999	4	manual(m5)	4	15
## 175	175	toyota	4runner 4wd	2.7	1999	4	auto(14)	4	16
## 176	176	toyota	4runner 4wd	3.4	1999	6	auto(14)	4	15
## 177	177	toyota	4runner 4wd	3.4	1999	6	manual(m5)	4	15
## 178	178	toyota	4runner 4wd	4.0	2008	6	auto(15)	4	16
## 179	179	toyota	4runner 4wd	4.7	2008	8	auto(15)	4	14
## 180	180	toyota	camry	2.2	1999	4	manual(m5)	f	21
## 181	181	toyota	camry	2.2	1999	4	auto(14)	f	21
## 182	182	toyota	camry	2.4	2008	4	manual(m5)	f	21
## 183	183	toyota	camry	2.4	2008	4	auto(15)	f	21
## 184	184	toyota	camry	3.0	1999	6	auto(14)	f	18
## 185	185	toyota	camry	3.0	1999	6	manual(m5)	f	18
## 186	186	toyota	camry	3.5	2008	6	auto(s6)	f	19
## 187	187	toyota	camry solara	2.2	1999	4	auto(14)	f	21
## 188	188	toyota	camry solara	2.2	1999	4	manual(m5)	f	21
## 189	189	toyota	camry solara	2.4	2008	4	manual(m5)	f	21
## 190	190	toyota	camry solara	2.4	2008	4	auto(s5)	f	22
## 191	191	toyota	camry solara	3.0	1999	6	auto(14)	f	18
## 192	192	toyota	camry solara	3.0	1999	6	manual(m5)	f	18
## 193	193	toyota	camry solara	3.3	2008	6	auto(s5)	f	18
## 194	194	toyota	corolla	1.8	1999	4	auto(13)	f	24
## 195	195	toyota	corolla	1.8	1999	4	auto(14)	f	24
## 196	196	toyota	corolla	1.8	1999	4	manual(m5)	f	26
## 197	197	toyota	corolla	1.8	2008	4	manual(m5)	f	28
## 198	198	toyota	corolla	1.8	2008	4	auto(14)	f	26
## 199	199	toyota	land cruiser wagon 4wd	4.7	1999	8	auto(14)	4	11
## 200	200	toyota	land cruiser wagon 4wd	5.7	2008	8	auto(s6)	4	13
## 201	201	toyota	toyota tacoma 4wd	2.7	1999	4	manual(m5)	4	15
## 202	202	toyota	toyota tacoma 4wd	2.7	1999	4	auto(14)	4	16

##	203	203	toyota	toyota tacoma 4wd	2.7	2008	4	manual(m5)	4	17
##	204	204	toyota	toyota tacoma 4wd	3.4	1999	6	manual(m5)	4	15
##	205	205	toyota	toyota tacoma 4wd	3.4	1999	6	auto(l4)	4	15
##	206	206	toyota	toyota tacoma 4wd	4.0	2008	6	manual(m6)	4	15
##	207	207	toyota	toyota tacoma 4wd	4.0	2008	6	auto(l5)	4	16
##	208	208	volkswagen	gti	2.0	1999	4	manual(m5)	f	21
##	209	209	volkswagen	gti	2.0	1999	4	auto(l4)	f	19
##	210	210	volkswagen	gti	2.0	2008	4	manual(m6)	f	21
##	211	211	volkswagen	gti	2.0	2008	4	auto(s6)	f	22
##	212	212	volkswagen	gti	2.8	1999	6	manual(m5)	f	17
##	213	213	volkswagen	jetta	1.9	1999	4	manual(m5)	f	33
##	214	214	volkswagen	jetta	2.0	1999	4	manual(m5)	f	21
##	215	215	volkswagen	jetta	2.0	1999	4	auto(l4)	f	19
##	216	216	volkswagen	jetta	2.0	2008	4	auto(s6)	f	22
##	217	217	volkswagen	jetta	2.0	2008	4	manual(m6)	f	21
##	218	218	volkswagen	jetta	2.5	2008	5	auto(s6)	f	21
##	219	219	volkswagen	jetta	2.5	2008	5	manual(m5)	f	21
##	220	220	volkswagen	jetta	2.8	1999	6	auto(l4)	f	16
##	221	221	volkswagen	jetta	2.8	1999	6	manual(m5)	f	17
##	222	222	volkswagen	new beetle	1.9	1999	4	manual(m5)	f	35
##	223	223	volkswagen	new beetle	1.9	1999	4	auto(l4)	f	29
##	224	224	volkswagen	new beetle	2.0	1999	4	manual(m5)	f	21
##	225	225	volkswagen	new beetle	2.0	1999	4	auto(l4)	f	19
##	226	226	volkswagen	new beetle	2.5	2008	5	manual(m5)	f	20
##	227	227	volkswagen	new beetle	2.5	2008	5	auto(s6)	f	20
##	228	228	volkswagen	passat	1.8	1999	4	manual(m5)	f	21
##	229	229	volkswagen	passat	1.8	1999	4	auto(l5)	f	18
##	230	230	volkswagen	passat	2.0	2008	4	auto(s6)	f	19
##	231	231	volkswagen	passat	2.0	2008	4	manual(m6)	f	21
##	232	232	volkswagen	passat	2.8	1999	6	auto(l5)	f	16
##	233	233	volkswagen	passat	2.8	1999	6	manual(m5)	f	18
##	234	234	volkswagen	passat	3.6	2008	6	auto(s6)	f	17
##			hwy	fl						
##	1	29	p	compact						
##	2	29	p	compact						
##	3	31	p	compact						
##	4	30	p	compact						
##	5	26	p	compact						
##	6	26	p	compact						
##	7	27	p	compact						
##	8	26	p	compact						
##	9	25	p	compact						
##	10	28	p	compact						
##	11	27	p	compact						
##	12	25	p	compact						
##	13	25	p	compact						
##	14	25	p	compact						
##	15	25	p	compact						
##	16	24	p	midsize						
##	17	25	p	midsize						
##	18	23	p	midsize						
##	19	20	r	suv						
##	20	15	e	suv						
##	21	20	r	suv						

##	22	17	r	suv
##	23	17	r	suv
##	24	26	p	2seater
##	25	23	p	2seater
##	26	26	p	2seater
##	27	25	p	2seater
##	28	24	p	2seater
##	29	19	r	suv
##	30	14	e	suv
##	31	15	r	suv
##	32	17	d	suv
##	33	27	r	midsize
##	34	30	r	midsize
##	35	26	r	midsize
##	36	29	r	midsize
##	37	26	r	midsize
##	38	24	r	minivan
##	39	24	r	minivan
##	40	22	r	minivan
##	41	22	r	minivan
##	42	24	r	minivan
##	43	24	r	minivan
##	44	17	e	minivan
##	45	22	r	minivan
##	46	21	r	minivan
##	47	23	r	minivan
##	48	23	r	minivan
##	49	19	r	pickup
##	50	18	r	pickup
##	51	17	r	pickup
##	52	17	r	pickup
##	53	19	r	pickup
##	54	19	r	pickup
##	55	12	e	pickup
##	56	17	r	pickup
##	57	15	r	pickup
##	58	17	r	suv
##	59	17	r	suv
##	60	12	e	suv
##	61	17	r	suv
##	62	16	r	suv
##	63	18	r	suv
##	64	15	r	suv
##	65	16	r	pickup
##	66	12	e	pickup
##	67	17	r	pickup
##	68	17	r	pickup
##	69	16	r	pickup
##	70	12	e	pickup
##	71	15	r	pickup
##	72	16	r	pickup
##	73	17	r	pickup
##	74	15	r	pickup
##	75	17	r	suv

## 76	17	r	suv
## 77	18	r	suv
## 78	17	r	suv
## 79	19	r	suv
## 80	17	r	suv
## 81	19	r	suv
## 82	19	r	suv
## 83	17	r	suv
## 84	17	r	pickup
## 85	17	r	pickup
## 86	16	r	pickup
## 87	16	r	pickup
## 88	17	r	pickup
## 89	15	r	pickup
## 90	17	r	pickup
## 91	26	r	subcompact
## 92	25	r	subcompact
## 93	26	r	subcompact
## 94	24	r	subcompact
## 95	21	r	subcompact
## 96	22	r	subcompact
## 97	23	r	subcompact
## 98	22	r	subcompact
## 99	20	p	subcompact
## 100	33	r	subcompact
## 101	32	r	subcompact
## 102	32	r	subcompact
## 103	29	p	subcompact
## 104	32	r	subcompact
## 105	34	r	subcompact
## 106	36	r	subcompact
## 107	36	c	subcompact
## 108	29	p	subcompact
## 109	26	r	midsize
## 110	27	r	midsize
## 111	30	r	midsize
## 112	31	r	midsize
## 113	26	r	midsize
## 114	26	r	midsize
## 115	28	r	midsize
## 116	26	r	subcompact
## 117	29	r	subcompact
## 118	28	r	subcompact
## 119	27	r	subcompact
## 120	24	r	subcompact
## 121	24	r	subcompact
## 122	24	r	subcompact
## 123	22	d	suv
## 124	19	r	suv
## 125	20	r	suv
## 126	17	r	suv
## 127	12	e	suv
## 128	19	r	suv
## 129	18	r	suv

##	130	14	p	suv
##	131	15	p	suv
##	132	18	r	suv
##	133	18	r	suv
##	134	15	p	suv
##	135	17	r	suv
##	136	16	p	suv
##	137	18	r	suv
##	138	17	r	suv
##	139	19	r	suv
##	140	19	r	suv
##	141	17	r	suv
##	142	29	r	compact
##	143	27	r	compact
##	144	31	r	midsize
##	145	32	r	midsize
##	146	27	p	midsize
##	147	26	p	midsize
##	148	26	r	midsize
##	149	25	r	midsize
##	150	25	p	midsize
##	151	17	r	suv
##	152	17	r	suv
##	153	20	p	suv
##	154	18	p	suv
##	155	26	r	midsize
##	156	26	p	midsize
##	157	27	r	midsize
##	158	28	r	midsize
##	159	25	p	midsize
##	160	25	r	suv
##	161	24	r	suv
##	162	27	r	suv
##	163	25	p	suv
##	164	26	r	suv
##	165	23	p	suv
##	166	26	r	subcompact
##	167	26	r	subcompact
##	168	26	r	subcompact
##	169	26	r	subcompact
##	170	25	p	compact
##	171	27	r	compact
##	172	25	p	compact
##	173	27	r	compact
##	174	20	r	suv
##	175	20	r	suv
##	176	19	r	suv
##	177	17	r	suv
##	178	20	r	suv
##	179	17	r	suv
##	180	29	r	midsize
##	181	27	r	midsize
##	182	31	r	midsize
##	183	31	r	midsize


```

## 184 26 r    midsize
## 185 26 r    midsize
## 186 28 r    midsize
## 187 27 r    compact
## 188 29 r    compact
## 189 31 r    compact
## 190 31 r    compact
## 191 26 r    compact
## 192 26 r    compact
## 193 27 r    compact
## 194 30 r    compact
## 195 33 r    compact
## 196 35 r    compact
## 197 37 r    compact
## 198 35 r    compact
## 199 15 r      suv
## 200 18 r      suv
## 201 20 r    pickup
## 202 20 r    pickup
## 203 22 r    pickup
## 204 17 r    pickup
## 205 19 r    pickup
## 206 18 r    pickup
## 207 20 r    pickup
## 208 29 r    compact
## 209 26 r    compact
## 210 29 p    compact
## 211 29 p    compact
## 212 24 r    compact
## 213 44 d    compact
## 214 29 r    compact
## 215 26 r    compact
## 216 29 p    compact
## 217 29 p    compact
## 218 29 r    compact
## 219 29 r    compact
## 220 23 r    compact
## 221 24 r    compact
## 222 44 d subcompact
## 223 41 d subcompact
## 224 29 r subcompact
## 225 26 r subcompact
## 226 28 r subcompact
## 227 29 r subcompact
## 228 29 p    midsize
## 229 29 p    midsize
## 230 28 p    midsize
## 231 29 p    midsize
## 232 26 p    midsize
## 233 26 p    midsize
## 234 26 p    midsize

```

##Categorical data includes the manufacturer, model name, transmission, year, number of cylinders,type
##The continuous variables are engine displacement, city miles per gallon, highway miles per gallon

```
library("dplyr")
```

```
## Warning: package 'dplyr' was built under R version 4.3.2
```

```
##
```

```
## 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
```

```
countMPG <- mpgDF %>%  
  count(manufacturer,model)  
countMPG
```

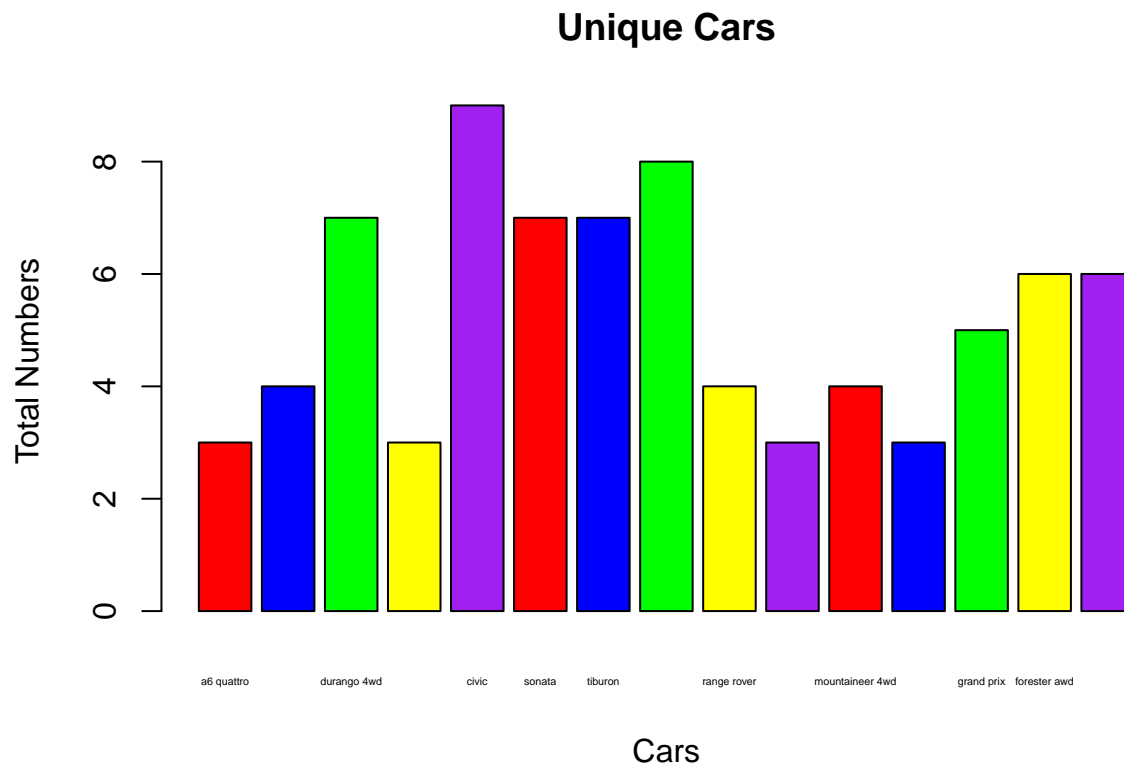
```
##   manufacturer      model  n  
## 1         audi          a4  7  
## 2         audi      a4 quattro  8  
## 3         audi      a6 quattro  3  
## 4    chevrolet  c1500 suburban 2wd  5  
## 5    chevrolet      corvette  5  
## 6    chevrolet  k1500 tahoe 4wd  4  
## 7    chevrolet      malibu  5  
## 8         dodge      caravan 2wd 11  
## 9         dodge  dakota pickup 4wd  9  
## 10        dodge      durango 4wd  7  
## 11        dodge  ram 1500 pickup 4wd 10  
## 12         ford      expedition 2wd  3  
## 13         ford      explorer 4wd  6  
## 14         ford  f150 pickup 4wd  7  
## 15         ford      mustang  9  
## 16         honda      civic  9  
## 17        hyundai      sonata  7  
## 18        hyundai      tiburon  7  
## 19         jeep  grand cherokee 4wd  8  
## 20    land rover      range rover  4  
## 21        lincoln      navigator 2wd  3  
## 22        mercury      mountaineer 4wd  4  
## 23         nissan      altima  6  
## 24         nissan      maxima  3  
## 25         nissan      pathfinder 4wd  4  
## 26        pontiac      grand prix  5  
## 27         subaru      forester awd  6  
## 28         subaru      impreza awd  8  
## 29         toyota      4runner 4wd  6  
## 30         toyota      camry  7  
## 31         toyota      camry solara  7  
## 32         toyota      corolla  5
```

```
## 33      toyota land cruiser wagon 4wd 2
## 34      toyota      toyota tacoma 4wd 7
## 35      volkswagen                gti 5
## 36      volkswagen                jetta 9
## 37      volkswagen                new beetle 6
## 38      volkswagen                passat 7
```

```
uniqueMPG <- countMPG[c(3,6,10,12,16:22,24,26,27,29),1:3,]
uniqueMPG
```

```
##      manufacturer      model n
## 3      audi      a6 quattro 3
## 6      chevrolet    k1500 tahoe 4wd 4
## 10     dodge      durango 4wd 7
## 12     ford      expedition 2wd 3
## 16     honda      civic 9
## 17     hyundai      sonata 7
## 18     hyundai      tiburon 7
## 19     jeep grand cherokee 4wd 8
## 20     land rover    range rover 4
## 21     lincoln      navigator 2wd 3
## 22     mercury      mountaineer 4wd 4
## 24     nissan      maxima 3
## 26     pontiac      grand prix 5
## 27     subaru      forester awd 6
## 29     toyota      4runner 4wd 6
```

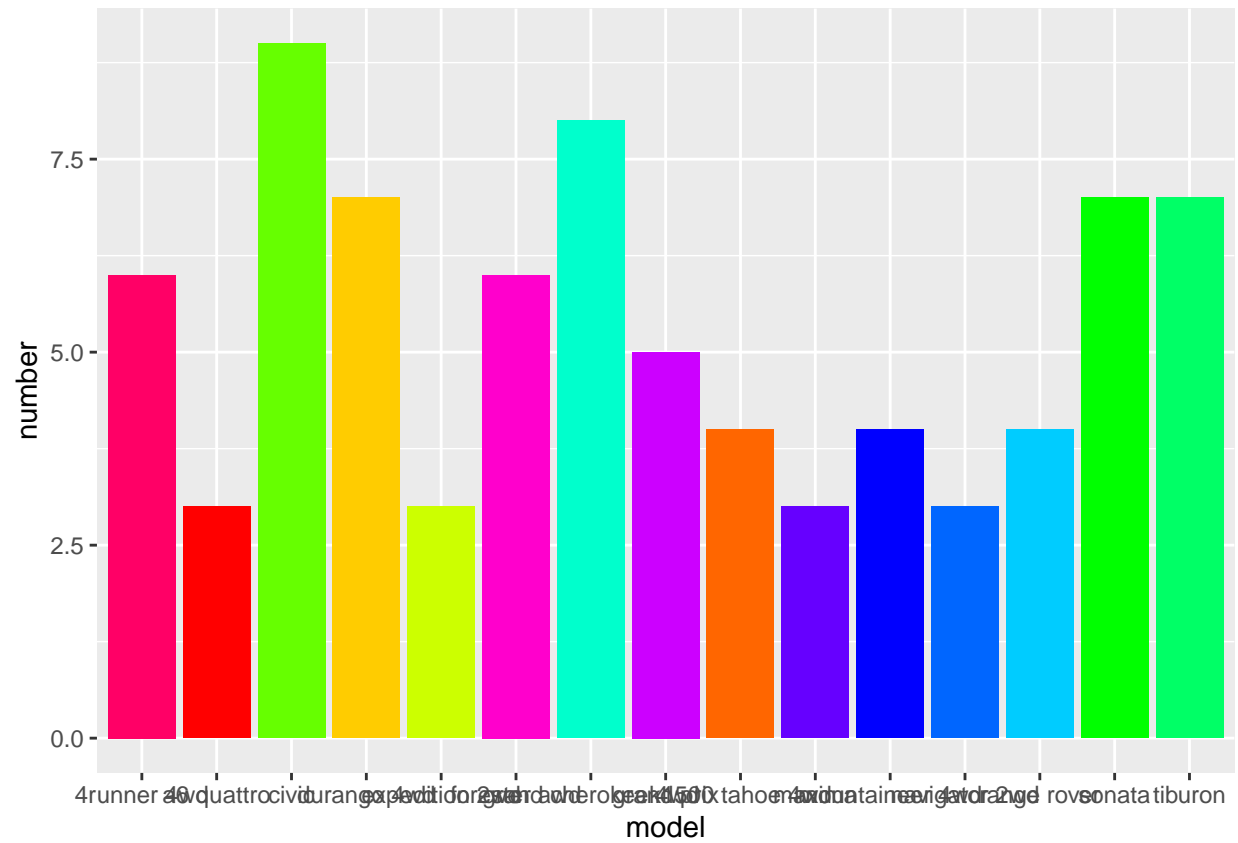
```
barplot(uniqueMPG$n, main = "Unique Cars",
        xlab = "Cars",
        ylab = "Total Numbers",
        names.arg = uniqueMPG$model,
        cex.names = 0.35,
        col = c("red", "blue", "green", "yellow", "purple"))
```



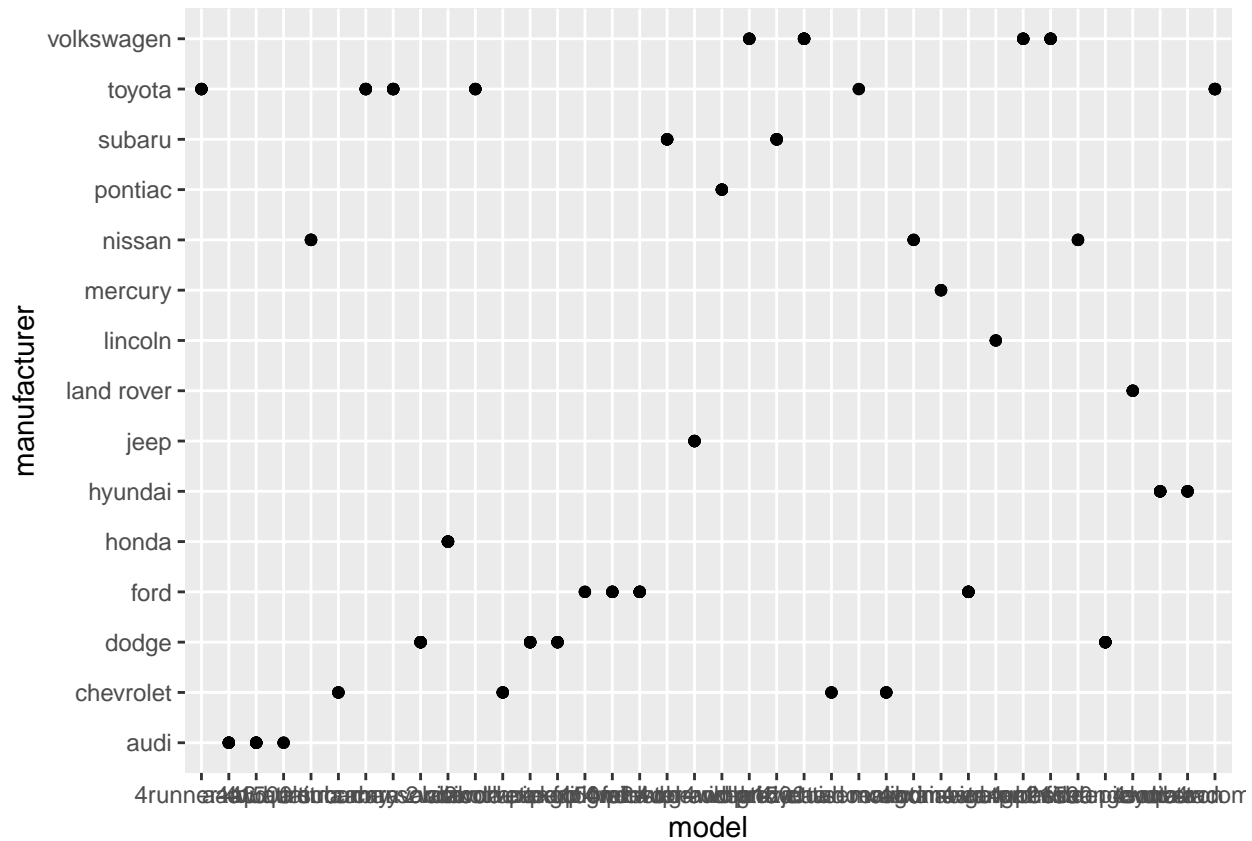
```
library("ggplot2")
```

```
## Warning: package 'ggplot2' was built under R version 4.3.2
```

```
number <- uniqueMPG$n
model <- uniqueMPG$model
ggplot(data = uniqueMPG,
       aes(x= model, y= number)) +
  geom_bar(stat='identity', fill = rainbow(15))
```



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



#this plot is not as useful. In order to modify it we need to choose a graph that suits the data set

```
first20 <- mpg[1:20,1:11]
first20Model <- first20$model
first20Num <- first20$n
```

```
## Warning: Unknown or uninitialised column: 'n'.
```