

# Data Frame Exploration

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## LaTeX Equations in R Markdown

Here is an equation:

$$\alpha = 5 + 2$$

Inline equation:  $\alpha = 5 + 2$ .

## Data frame exploration

### Setting up

First, load the `gapminder` R package. If you don't have it installed, run `install.packages("gapminder")` in the console first.

```
library(gapminder)
```

```
## Warning: package 'gapminder' was built under R version 3.3.2
```

### What is a data frame?

It's tabular data. To get a sense of this, go ahead and print out the `gapminder` object (you might want to do this in the console!).

### Exploration of data frames

Let's explore `gapminder` with functions like `head`, `ncol`, `str`, `summary`.

```
head(gapminder)
```

```
## # A tibble: 6 x 6
##   country continent year lifeExp      pop gdpPercap
##   <fctr>    <fctr> <int>   <dbl>    <int>    <dbl>
## 1 Afghanistan      Asia  1952  28.801  8425333  779.4453
## 2 Afghanistan      Asia  1957  30.332  9240934  820.8530
## 3 Afghanistan      Asia  1962  31.997 10267083  853.1007
## 4 Afghanistan      Asia  1967  34.020 11537966  836.1971
## 5 Afghanistan      Asia  1972  36.088 13079460  739.9811
## 6 Afghanistan      Asia  1977  38.438 14880372  786.1134
```

```
str(gapminder)
```

```
## Classes 'tbl_df', 'tbl' and 'data.frame': 1704 obs. of 6 variables:
## $ country : Factor w/ 142 levels "Afghanistan",...: 1 1 1 1 1 1 1 1 1 1 ...
## $ continent: Factor w/ 5 levels "Africa","Americas",...: 3 3 3 3 3 3 3 3 3 3 ...
## $ year : int 1952 1957 1962 1967 1972 1977 1982 1987 1992 1997 ...
## $ lifeExp : num 28.8 30.3 32 34 36.1 ...
## $ pop : int 8425333 9240934 10267083 11537966 13079460 14880372 12881816 13867957 16317921 22...
## $ gdpPercap: num 779 821 853 836 740 ...
```

```
ncol(gapminder)
```

```
## [1] 6
```

```
summary(gapminder)
```

```
##          country      continent      year      lifeExp
## Afghanistan: 12 Africa :624 Min. :1952 Min. :23.60
## Albania : 12 Americas:300 1st Qu.:1966 1st Qu.:48.20
## Algeria : 12 Asia :396 Median :1980 Median :60.71
## Angola : 12 Europe :360 Mean :1980 Mean :59.47
## Argentina : 12 Oceania : 24 3rd Qu.:1993 3rd Qu.:70.85
## Australia : 12 Max. :2007 Max. :82.60
## (Other) :1632
##      pop      gdpPercap
## Min. :6.001e+04 Min. : 241.2
## 1st Qu.:2.794e+06 1st Qu.: 1202.1
## Median :7.024e+06 Median : 3531.8
## Mean :2.960e+07 Mean : 7215.3
## 3rd Qu.:1.959e+07 3rd Qu.: 9325.5
## Max. :1.319e+09 Max. :113523.1
##
```

## Extracting columns/“variables”

Let's extract a column with \$. Maybe compute its variance.

```
gapminder$pop
```

```
##      [1] 8425333 9240934 10267083 11537966 13079460 14880372
##      [7] 12881816 13867957 16317921 22227415 25268405 31889923
##     [13] 1282697 1476505 1728137 1984060 2263554 2509048
##     [19] 2780097 3075321 3326498 3428038 3508512 3600523
##     [25] 9279525 10270856 11000948 12760499 14760787 17152804
##     [31] 20033753 23254956 26298373 29072015 31287142 33333216
##     [37] 4232095 4561361 4826015 5247469 5894858 6162675
##     [43] 7016384 7874230 8735988 9875024 10866106 12420476
##     [49] 17876956 19610538 21283783 22934225 24779799 26983828
##     [55] 29341374 31620918 33958947 36203463 38331121 40301927
##     [61] 8691212 9712569 10794968 11872264 13177000 14074100
```

##	[67]	15184200	16257249	17481977	18565243	19546792	20434176
##	[73]	6927772	6965860	7129864	7376998	7544201	7568430
##	[79]	7574613	7578903	7914969	8069876	8148312	8199783
##	[85]	120447	138655	171863	202182	230800	297410
##	[91]	377967	454612	529491	598561	656397	708573
##	[97]	46886859	51365468	56839289	62821884	70759295	80428306
##	[103]	93074406	103764241	113704579	123315288	135656790	150448339
##	[109]	8730405	8989111	9218400	9556500	9709100	9821800
##	[115]	9856303	9870200	10045622	10199787	10311970	10392226
##	[121]	1738315	1925173	2151895	2427334	2761407	3168267
##	[127]	3641603	4243788	4981671	6066080	7026113	8078314
##	[133]	2883315	3211738	3593918	4040665	4565872	5079716
##	[139]	5642224	6156369	6893451	7693188	8445134	9119152
##	[145]	2791000	3076000	3349000	3585000	3819000	4086000
##	[151]	4172693	4338977	4256013	3607000	4165416	4552198
##	[157]	442308	474639	512764	553541	619351	781472
##	[163]	970347	1151184	1342614	1536536	1630347	1639131
##	[169]	56602560	65551171	76039390	88049823	100840058	114313951
##	[175]	128962939	142938076	155975974	168546719	179914212	190010647
##	[181]	7274900	7651254	8012946	8310226	8576200	8797022
##	[187]	8892098	8971958	8658506	8066057	7661799	7322858
##	[193]	4469979	4713416	4919632	5127935	5433886	5889574
##	[199]	6634596	7586551	8878303	10352843	12251209	14326203
##	[205]	2445618	2667518	2961915	3330989	3529983	3834415
##	[211]	4580410	5126023	5809236	6121610	7021078	8390505
##	[217]	4693836	5322536	6083619	6960067	7450606	6978607
##	[223]	7272485	8371791	10150094	11782962	12926707	14131858
##	[229]	5009067	5359923	5793633	6335506	7021028	7959865
##	[235]	9250831	10780667	12467171	14195809	15929988	17696293
##	[241]	14785584	17010154	18985849	20819767	22284500	23796400
##	[247]	25201900	26549700	28523502	30305843	31902268	33390141
##	[253]	1291695	1392284	1523478	1733638	1927260	2167533
##	[259]	2476971	2840009	3265124	3696513	4048013	4369038
##	[265]	2682462	2894855	3150417	3495967	3899068	4388260
##	[271]	4875118	5498955	6429417	7562011	8835739	10238807
##	[277]	6377619	7048426	7961258	8858908	9717524	10599793
##	[283]	11487112	12463354	13572994	14599929	15497046	16284741
##	[289]	556263527	637408000	665770000	754550000	862030000	943455000
##	[295]	1000281000	1084035000	1164970000	1230075000	1280400000	1318683096
##	[301]	12350771	14485993	17009885	19764027	22542890	25094412
##	[307]	27764644	30964245	34202721	37657830	41008227	44227550
##	[313]	153936	170928	191689	217378	250027	304739
##	[319]	348643	395114	454429	527982	614382	710960
##	[325]	14100005	15577932	17486434	19941073	23007669	26480870
##	[331]	30646495	35481645	41672143	47798986	55379852	64606759
##	[337]	854885	940458	1047924	1179760	1340458	1536769
##	[343]	1774735	2064095	2409073	2800947	3328795	3800610
##	[349]	926317	1112300	1345187	1588717	1834796	2108457
##	[355]	2424367	2799811	3173216	3518107	3834934	4133884
##	[361]	2977019	3300000	3832408	4744870	6071696	7459574
##	[367]	9025951	10761098	12772596	14625967	16252726	18013409
##	[373]	3882229	3991242	4076557	4174366	4225310	4318673
##	[379]	4413368	4484310	4494013	4444595	4481020	4493312
##	[385]	6007797	6640752	7254373	8139332	8831348	9537988

##	[391]	9789224	10239839	10723260	10983007	11226999	11416987
##	[397]	9125183	9513758	9620282	9835109	9862158	10161915
##	[403]	10303704	10311597	10315702	10300707	10256295	10228744
##	[409]	4334000	4487831	4646899	4838800	4991596	5088419
##	[415]	5117810	5127024	5171393	5283663	5374693	5468120
##	[421]	63149	71851	89898	127617	178848	228694
##	[427]	305991	311025	384156	417908	447416	496374
##	[433]	2491346	2923186	3453434	4049146	4671329	5302800
##	[439]	5968349	6655297	7351181	7992357	8650322	9319622
##	[445]	3548753	4058385	4681707	5432424	6298651	7278866
##	[451]	8365850	9545158	10748394	11911819	12921234	13755680
##	[457]	22223309	25009741	28173309	31681188	34807417	38783863
##	[463]	45681811	52799062	59402198	66134291	73312559	80264543
##	[469]	2042865	2355805	2747687	3232927	3790903	4282586
##	[475]	4474873	4842194	5274649	5783439	6353681	6939688
##	[481]	216964	232922	249220	259864	277603	192675
##	[487]	285483	341244	387838	439971	495627	551201
##	[493]	1438760	1542611	1666618	1820319	2260187	2512642
##	[499]	2637297	2915959	3668440	4058319	4414865	4906585
##	[505]	20860941	22815614	25145372	27860297	30770372	34617799
##	[511]	38111756	42999530	52088559	59861301	67946797	76511887
##	[517]	4090500	4324000	4491443	4605744	4639657	4738902
##	[523]	4826933	4931729	5041039	5134406	5193039	5238460
##	[529]	42459667	44310863	47124000	49569000	51732000	53165019
##	[535]	54433565	55630100	57374179	58623428	59925035	61083916
##	[541]	420702	434904	455661	489004	537977	706367
##	[547]	753874	880397	985739	1126189	1299304	1454867
##	[553]	284320	323150	374020	439593	517101	608274
##	[559]	715523	848406	1025384	1235767	1457766	1688359
##	[565]	69145952	71019069	73739117	76368453	78717088	78160773
##	[571]	78335266	77718298	80597764	82011073	82350671	82400996
##	[577]	5581001	6391288	7355248	8490213	9354120	10538093
##	[583]	11400338	14168101	16278738	18418288	20550751	22873338
##	[589]	7733250	8096218	8448233	8716441	8888628	9308479
##	[595]	9786480	9974490	10325429	10502372	10603863	10706290
##	[601]	3146381	3640876	4208858	4690773	5149581	5703430
##	[607]	6395630	7326406	8486949	9803875	11178650	12572928
##	[613]	2664249	2876726	3140003	3451418	3811387	4227026
##	[619]	4710497	5650262	6990574	8048834	8807818	9947814
##	[625]	580653	601095	627820	601287	625361	745228
##	[631]	825987	927524	1050938	1193708	1332459	1472041
##	[637]	3201488	3507701	3880130	4318137	4698301	4908554
##	[643]	5198399	5756203	6326682	6913545	7607651	8502814
##	[649]	1517453	1770390	2090162	2500689	2965146	3055235
##	[655]	3669448	4372203	5077347	5867957	6677328	7483763
##	[661]	2125900	2736300	3305200	3722800	4115700	4583700
##	[667]	5264500	5584510	5829696	6495918	6762476	6980412
##	[673]	9504000	9839000	10063000	10223422	10394091	10637171
##	[679]	10705535	10612740	10348684	10244684	10083313	9956108
##	[685]	147962	165110	182053	198676	209275	221823
##	[691]	233997	244676	259012	271192	288030	301931
##	[697]	372000000	409000000	454000000	506000000	567000000	634000000
##	[703]	708000000	788000000	872000000	959000000	1034172547	1110396331
##	[709]	82052000	90124000	99028000	109343000	121282000	136725000

##	[715]	153343000	169276000	184816000	199278000	211060000	223547000
##	[721]	17272000	19792000	22874000	26538000	30614000	35480679
##	[727]	43072751	51889696	60397973	63327987	66907826	69453570
##	[733]	5441766	6248643	7240260	8519282	10061506	11882916
##	[739]	14173318	16543189	17861905	20775703	24001816	27499638
##	[745]	2952156	2878220	2830000	2900100	3024400	3271900
##	[751]	3480000	3539900	3557761	3667233	3879155	4109086
##	[757]	1620914	1944401	2310904	2693585	3095893	3495918
##	[763]	3858421	4203148	4936550	5531387	6029529	6426679
##	[769]	47666000	49182000	50843200	52667100	54365564	56059245
##	[775]	56535636	56729703	56840847	57479469	57926999	58147733
##	[781]	1426095	1535090	1665128	1861096	1997616	2156814
##	[787]	2298309	2326606	2378618	2531311	2664659	2780132
##	[793]	86459025	91563009	95831757	100825279	107188273	113872473
##	[799]	118454974	122091325	124329269	125956499	127065841	127467972
##	[805]	607914	746559	933559	1255058	1613551	1937652
##	[811]	2347031	2820042	3867409	4526235	5307470	6053193
##	[817]	6464046	7454779	8678557	10191512	12044785	14500404
##	[823]	17661452	21198082	25020539	28263827	31386842	35610177
##	[829]	8865488	9411381	10917494	12617009	14781241	16325320
##	[835]	17647518	19067554	20711375	21585105	22215365	23301725
##	[841]	20947571	22611552	26420307	30131000	33505000	36436000
##	[847]	39326000	41622000	43805450	46173816	47969150	49044790
##	[853]	160000	212846	358266	575003	841934	1140357
##	[859]	1497494	1891487	1418095	1765345	2111561	2505559
##	[865]	1439529	1647412	1886848	2186894	2680018	3115787
##	[871]	3086876	3089353	3219994	3430388	3677780	3921278
##	[877]	748747	813338	893143	996380	1116779	1251524
##	[883]	1411807	1599200	1803195	1982823	2046772	2012649
##	[889]	863308	975950	1112796	1279406	1482628	1703617
##	[895]	1956875	2269414	1912974	2200725	2814651	3193942
##	[901]	1019729	1201578	1441863	1759224	2183877	2721783
##	[907]	3344074	3799845	4364501	4759670	5368585	6036914
##	[913]	4762912	5181679	5703324	6334556	7082430	8007166
##	[919]	9171477	10568642	12210395	14165114	16473477	19167654
##	[925]	2917802	3221238	3628608	4147252	4730997	5637246
##	[931]	6502825	7824747	10014249	10419991	11824495	13327079
##	[937]	6748378	7739235	8906385	10154878	11441462	12845381
##	[943]	14441916	16331785	18319502	20476091	22662365	24821286
##	[949]	3838168	4241884	4690372	5212416	5828158	6491649
##	[955]	6998256	7634008	8416215	9384984	10580176	12031795
##	[961]	1022556	1076852	1146757	1230542	1332786	1456688
##	[967]	1622136	1841240	2119465	2444741	2828858	3270065
##	[973]	516556	609816	701016	789309	851334	913025
##	[979]	992040	1042663	1096202	1149818	1200206	1250882
##	[985]	30144317	35015548	41121485	47995559	55984294	63759976
##	[991]	71640904	80122492	88111030	95895146	102479927	108700891
##	[997]	800663	882134	1010280	1149500	1320500	1528000
##	[1003]	1756032	2015133	2312802	2494803	2674234	2874127
##	[1009]	413834	442829	474528	501035	527678	560073
##	[1015]	562548	569473	621621	692651	720230	684736
##	[1021]	9939217	11406350	13056604	14770296	16660670	18396941
##	[1027]	20198730	22987397	25798239	28529501	31167783	33757175
##	[1033]	6446316	7038035	7788944	8680909	9809596	11127868

## [1039]	12587223	12891952	13160731	16603334	18473780	19951656
## [1045]	20092996	21731844	23634436	25870271	28466390	31528087
## [1051]	34680442	38028578	40546538	43247867	45598081	47761980
## [1057]	485831	548080	621392	706640	821782	977026
## [1063]	1099010	1278184	1554253	1774766	1972153	2055080
## [1069]	9182536	9682338	10332057	11261690	12412593	13933198
## [1075]	15796314	17917180	20326209	23001113	25873917	28901790
## [1081]	10381988	11026383	11805689	12596822	13329874	13852989
## [1087]	14310401	14665278	15174244	15604464	16122830	16570613
## [1093]	1994794	2229407	2488550	2728150	2929100	3164900
## [1099]	3210650	3317166	3437674	3676187	3908037	4115771
## [1105]	1165790	1358828	1590597	1865490	2182908	2554598
## [1111]	2979423	3344353	4017939	4609572	5146848	5675356
## [1117]	3379468	3692184	4076008	4534062	5060262	5682086
## [1123]	6437188	7332638	8392818	9666252	11140655	12894865
## [1129]	33119096	37173340	41871351	47287752	53740085	62209173
## [1135]	73039376	81551520	93364244	106207839	119901274	135031164
## [1141]	3327728	3491938	3638919	3786019	3933004	4043205
## [1147]	4114787	4186147	4286357	4405672	4535591	4627926
## [1153]	507833	561977	628164	714775	829050	1004533
## [1159]	1301048	1593882	1915208	2283635	2713462	3204897
## [1165]	41346560	46679944	53100671	60641899	69325921	78152686
## [1171]	91462088	105186881	120065004	135564834	153403524	169270617
## [1177]	940080	1063506	1215725	1405486	1616384	1839782
## [1183]	2036305	2253639	2484997	2734531	2990875	3242173
## [1189]	1555876	1770902	2009813	2287985	2614104	2984494
## [1195]	3366439	3886512	4483945	5154123	5884491	6667147
## [1201]	8025700	9146100	10516500	12132200	13954700	15990099
## [1207]	18125129	20195924	22430449	24748122	26769436	28674757
## [1213]	22438691	26072194	30325264	35356600	40850141	46850962
## [1219]	53456774	60017788	67185766	75012988	82995088	91077287
## [1225]	25730551	28235346	30329617	31785378	33039545	34621254
## [1231]	36227381	37740710	38370697	38654957	38625976	38518241
## [1237]	8526050	8817650	9019800	9103000	8970450	9662600
## [1243]	9859650	9915289	9927680	10156415	10433867	10642836
## [1249]	2227000	2260000	2448046	2648961	2847132	3080828
## [1255]	3279001	3444468	3585176	3759430	3859606	3942491
## [1261]	257700	308700	358900	414024	461633	492095
## [1267]	517810	562035	622191	684810	743981	798094
## [1273]	16630000	17829327	18680721	19284814	20662648	21658597
## [1279]	22356726	22686371	22797027	22562458	22404337	22276056
## [1285]	2534927	2822082	3051242	3451079	3992121	4657072
## [1291]	5507565	6349365	7290203	7212583	7852401	8860588
## [1297]	60011	61325	65345	70787	76595	86796
## [1303]	98593	110812	125911	145608	170372	199579
## [1309]	4005677	4419650	4943029	5618198	6472756	8128505
## [1315]	11254672	14619745	16945857	21229759	24501530	27601038
## [1321]	2755589	3054547	3430243	3965841	4588696	5260855
## [1327]	6147783	7171347	8307920	9535314	10870037	12267493
## [1333]	6860147	7271135	7616060	7971222	8313288	8686367
## [1339]	9032824	9230783	9826397	10336594	10111559	10150265
## [1345]	2143249	2295678	2467895	2662190	2879013	3140897
## [1351]	3464522	3868905	4260884	4578212	5359092	6144562
## [1357]	1127000	1445929	1750200	1977600	2152400	2325300

## [1363]	2651869	2794552	3235865	3802309	4197776	4553009
## [1369]	3558137	3844277	4237384	4442238	4593433	4827803
## [1375]	5048043	5199318	5302888	5383010	5410052	5447502
## [1381]	1489518	1533070	1582962	1646912	1694510	1746919
## [1387]	1861252	1945870	1999210	2011612	2011497	2009245
## [1393]	2526994	2780415	3080153	3428839	3840161	4353666
## [1399]	5828892	6921858	6099799	6633514	7753310	9118773
## [1405]	14264935	16151549	18356657	20997321	23935810	27129932
## [1411]	31140029	35933379	39964159	42835005	44433622	43997828
## [1417]	28549870	29841614	31158061	32850275	34513161	36439000
## [1423]	37983310	38880702	39549438	39855442	40152517	40448191
## [1429]	7982342	9128546	10421936	11737396	13016733	14116836
## [1435]	15410151	16495304	17587060	18698655	19576783	20378239
## [1441]	8504667	9753392	11183227	12716129	14597019	17104986
## [1447]	20367053	24725960	28227588	32160729	37090298	42292929
## [1453]	290243	326741	370006	420690	480105	551425
## [1459]	649901	779348	962344	1054486	1130269	1133066
## [1465]	7124673	7363802	7561588	7867931	8122293	8251648
## [1471]	8325260	8421403	8718867	8897619	8954175	9031088
## [1477]	4815000	5126000	5666000	6063000	6401400	6316424
## [1483]	6468126	6649942	6995447	7193761	7361757	7554661
## [1489]	3661549	4149908	4834621	5680812	6701172	7932503
## [1495]	9410494	11242847	13219062	15081016	17155814	19314747
## [1501]	8550362	10164215	11918938	13648692	15226039	16785196
## [1507]	18501390	19757799	20686918	21628605	22454239	23174294
## [1513]	8322925	9452826	10863958	12607312	14706593	17129565
## [1519]	19844382	23040630	26605473	30686889	34593779	38139640
## [1525]	21289402	25041917	29263397	34024249	39276153	44148285
## [1531]	48827160	52910342	56667095	60216677	62806748	65068149
## [1537]	1219113	1357445	1528098	1735550	2056351	2308582
## [1543]	2644765	3154264	3747553	4320890	4977378	5701579
## [1549]	662850	764900	887498	960155	975199	1039009
## [1555]	1116479	1191336	1183669	1138101	1101832	1056608
## [1561]	3647735	3950849	4286552	4786986	5303507	6005061
## [1567]	6734098	7724976	8523077	9231669	9770575	10276158
## [1573]	22235677	25670939	29788695	33411317	37492953	42404033
## [1579]	47328791	52881328	58179144	63047647	67308928	71158647
## [1585]	5824797	6675501	7688797	8900294	10190285	11457758
## [1591]	12939400	15283050	18252190	21210254	24739869	29170398
## [1597]	50430000	51430000	53292000	54959000	56079000	56179000
## [1603]	56339704	56981620	57866349	58808266	59912431	60776238
## [1609]	157553000	171984000	186538000	198712000	209896000	220239000
## [1615]	232187835	242803533	256894189	272911760	287675526	301139947
## [1621]	2252965	2424959	2598466	2748579	2829526	2873520
## [1627]	2953997	3045153	3149262	3262838	3363085	3447496
## [1633]	5439568	6702668	8143375	9709552	11515649	13503563
## [1639]	15620766	17910182	20265563	22374398	24287670	26084662
## [1645]	26246839	28998543	33796140	39463910	44655014	50533506
## [1651]	56142181	62826491	69940728	76048996	80908147	85262356
## [1657]	1030585	1070439	1133134	1142636	1089572	1261091
## [1663]	1425876	1691210	2104779	2826046	3389578	4018332
## [1669]	4963829	5498090	6120081	6740785	7407075	8403990
## [1675]	9657618	11219340	13367997	15826497	18701257	22211743
## [1681]	2672000	3016000	3421000	3900000	4506497	5216550

```
## [1687]    6100407    7272406    8381163    9417789    10595811    11746035
## [1693]    3080907    3646340    4277736    4995432    5861135    6642107
## [1699]    7636524    9216418    10704340    11404948    11926563    12311143
```

## Exploration another data frames mtcars

```
head(mtcars)
```

```
##           mpg  cyl  disp  hp drat   wt  qsec vs am gear carb
## Mazda RX4      21.0   6  160 110 3.90 2.620 16.46 0  1   4    4
## Mazda RX4 Wag  21.0   6  160 110 3.90 2.875 17.02 0  1   4    4
## Datsun 710     22.8   4  108  93 3.85 2.320 18.61 1  1   4    1
## Hornet 4 Drive  21.4   6  258 110 3.08 3.215 19.44 1  0   3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02 0  0   3    2
## Valiant        18.1   6  225 105 2.76 3.460 20.22 1  0   3    1
```

```
str(mtcars)
```

```
## 'data.frame':   32 obs. of  11 variables:
## $ mpg : num  21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
## $ cyl : num  6 6 4 6 8 6 8 4 4 6 ...
## $ disp: num  160 160 108 258 360 ...
## $ hp : num  110 110 93 110 175 105 245 62 95 123 ...
## $ drat: num  3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
## $ wt : num  2.62 2.88 2.32 3.21 3.44 ...
## $ qsec: num  16.5 17 18.6 19.4 17 ...
## $ vs : num  0 0 1 1 0 1 0 1 1 1 ...
## $ am : num  1 1 1 0 0 0 0 0 0 0 ...
## $ gear: num  4 4 4 3 3 3 3 4 4 4 ...
## $ carb: num  4 4 1 1 2 1 4 2 2 4 ...
```

```
ncol(mtcars)
```

```
## [1] 11
```

```
summary(mtcars)
```

```
##           mpg           cyl           disp           hp
## Min.      :10.40   Min.      :4.000   Min.      : 71.1   Min.      : 52.0
## 1st Qu.:15.43   1st Qu.:4.000   1st Qu.:120.8   1st Qu.: 96.5
## Median :19.20   Median :6.000   Median :196.3   Median :123.0
## Mean      :20.09   Mean      :6.188   Mean      :230.7   Mean      :146.7
## 3rd Qu.:22.80   3rd Qu.:8.000   3rd Qu.:326.0   3rd Qu.:180.0
## Max.      :33.90   Max.      :8.000   Max.      :472.0   Max.      :335.0
##           drat           wt           qsec           vs
## Min.      :2.760   Min.      :1.513   Min.      :14.50   Min.      :0.0000
## 1st Qu.:3.080   1st Qu.:2.581   1st Qu.:16.89   1st Qu.:0.0000
## Median :3.695   Median :3.325   Median :17.71   Median :0.0000
## Mean      :3.597   Mean      :3.217   Mean      :17.85   Mean      :0.4375
## 3rd Qu.:3.920   3rd Qu.:3.610   3rd Qu.:18.90   3rd Qu.:1.0000
## Max.      :4.930   Max.      :5.424   Max.      :22.90   Max.      :1.0000
```



##	am	gear	carb
##	Min. :0.0000	Min. :3.000	Min. :1.000
##	1st Qu.:0.0000	1st Qu.:3.000	1st Qu.:2.000
##	Median :0.0000	Median :4.000	Median :2.000
##	Mean :0.4062	Mean :3.688	Mean :2.812
##	3rd Qu.:1.0000	3rd Qu.:4.000	3rd Qu.:4.000
##	Max. :1.0000	Max. :5.000	Max. :8.000