סטטיסטיקה תיאורית - תרגיל

קובץ נתוני המכונית mtcars

A	B	C	D	E	F	G	H	I	J	K	L
model	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21	6	160	110	3.9	2.62	16.46	0	1	4	4
Mazda RX4 Wag	21	6	160	110	3.9	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.32	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	3.44	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.46	20.22	1	0	3	1
Duster 360	14.3	8	360	245	3.21	3.57	15.84	0	0	3	4
Merc 240D	24.4	4	146.7	62	3.69	3.19	20	1	0	4	2
Merc 230	22.8	4	140.8	95	3.92	3.15	22.9	1	0	4	2
Merc 280	19.2	6	167.6	123	3.92	3.44	18.3	1	0	4	4
Merc 280C	17.8	6	167.6	123	3.92	3.44	18.9	1	0	4	4
Merc 450SE	16.4	8	275.8	180	3.07	4.07	17.4	0	0	3	3
Merc 450SL	17.3	8	275.8	180	3.07	3.73	17.6	0	0	3	3
Merc 450SLC	15.2	8	275.8	180	3.07	3.78	18	0	0	3	3
Cadillac Fleetwood	10.4	8	472	205	2.93	5.25	17.98	0	0	3	4
Lincoln Continental	10.4	8	460	215	3	5.424	17.82	0	0	3	4
Chrysler Imperial	14.7	8	440	230	3.23	5.345	17.42	0	0	3	4
Fiat 128	32.4	4	78.7	66	4.08	2.2	19.47	1	1	4	1
Honda Civic	30.4	4	75.7	52	4.93	1.615	18.52	1	1	4	2

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באיזה סולם מדידה נמדד כל משתנה?

Motor Trend Car Road Tests

Description

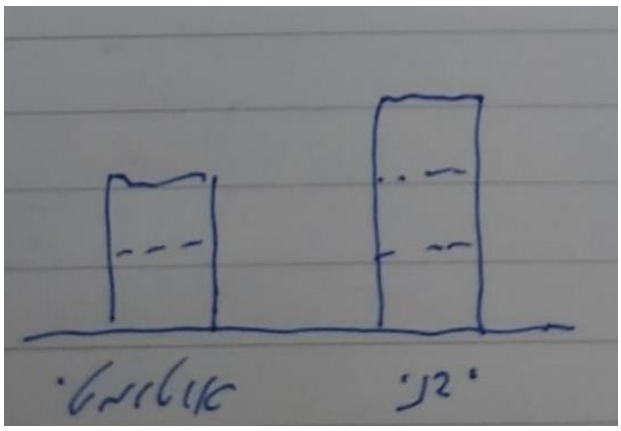
The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973–74 models).

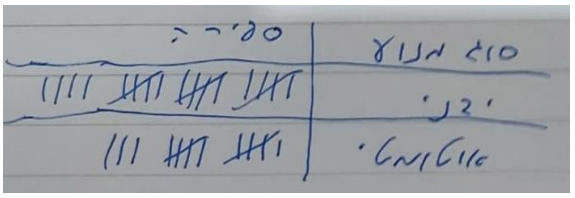
Variables description:

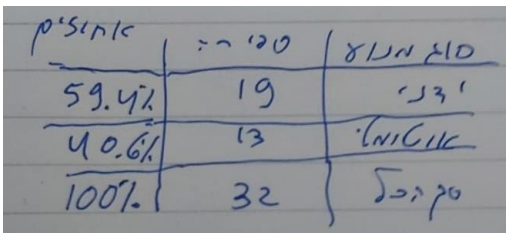
- Model Model name
- mpg Miles/(US) gallon
- cyl Number of cylinders
- disp Displacement (cu.in.) (נפח המנוע באינצ'ים מעוקבים)
- hp Gross horsepower
- drat Rear axle ratio
- wt Weight (1000 lbs)
- qsec 1/4 mile time (משך הזמן הנדרש לרכב לעבור 400 מטר/רבע מייל כאשר מתחילים ממצב עמידה*)
- vs Engine (0 = V-shaped, 1 = straight)
- am Transmission (0 = automatic, 1 = manual)
- gear Number of forward gears
- carb Number of carburetors

תיאור משתנה שמי – סוג תיבת ההילוכים (am)

am Transmission (0 = automatic, 1 = manual)







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תיאור משתנה שמי – סוג תיבת ההילוכים (am)

	A	B	C	D	E	F	G	H	I	J	K	L
1	model	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
2	Mazda RX4	21	6	160	110	3.9	2.62	16.46	0	1	4	4
3	Mazda RX4 Wag	21	6	160	110	3.9	2.875	17.02	0	1	4	4
4	Datsun 710	22.8	4	108	93	3.85	2.32	18.61	1	1	4	1
5	Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
6	Hornet Sportabout	18.7	8	360	175	3.15	3.44	17.02	0	0	3	2
7	Valiant	18.1	6	225	105	2.76	3.46	20.22	1	0	3	1
8	Duster 360	14.3	8	360	245	3.21	3.57	15.84	0	0	3	4
9	Merc 240D	24.4	4	146.7	62	3.69	3.19	20	1	0	4	2
10	Merc 230	22.8	4	140.8	95	3.92	3.15	22.9	1	0	4	2
11	Merc 280	19.2	6	167.6								
12	Merc 280C	17.8	6	167.6								
13	Merc 450SE	16.4	8	275.8								
14	Merc 450SL	17.3	8	275.8								
15	Merc 450SLC	15.2	8	275.8								
16	Cadillac Fleetwood	10.4	8	472								
17	Lincoln Continental	10.4	8	460								
18	Chrysler Imperial	14.7	8	440	230	3.23	5.345	17.42				
19	Fiat 128	32.4	4	78.7	66	4.08	2.2	19.47				
20	Honda Civic	30.4	4	75.7	52	4.93	1.615	18.52				
21	Toyota Corolla	33.9	4	71.1	65	4.22	1.835	19.9				
22	Toyota Corona	21.5	4	120.1	97	3.7	2.465	20.01				
23	Dodge Challenger	15.5	8	318	150	2.76	3.52	16.87				
24	AMC Javelin	15.2	8	304	150	3.15	3.435	17.3				
25	Camaro Z28	13.3	8	350	245	3.73	3.84	15.41				
26	Pontiac Firebird	19.2	8	400	175	3.08	3.845	17.05				
27	Fiat X1-9	27.3	4	79	66	4.08	1.935	18.9				
28	Porsche 914-2	26	4	120.3	91	4.43	2.14	16.7				
29	Lotus Europa	30.4	4	95.1	113	3.77	1.513	16.9				
30	Ford Pantera L	15.8	8	351	264	4.22	3.17	14.5				
31	Ferrari Dino	19.7	6	145	175	3.62	2.77	15.5				
32	Maserati Bora	15	8	301	335	3.54	3.57	14.6				
33	Volvo 142E	21.4	4	121	109	4.11	2.78	18.6				
34												

Average: 0.40625 Count: 32 Sum: 13

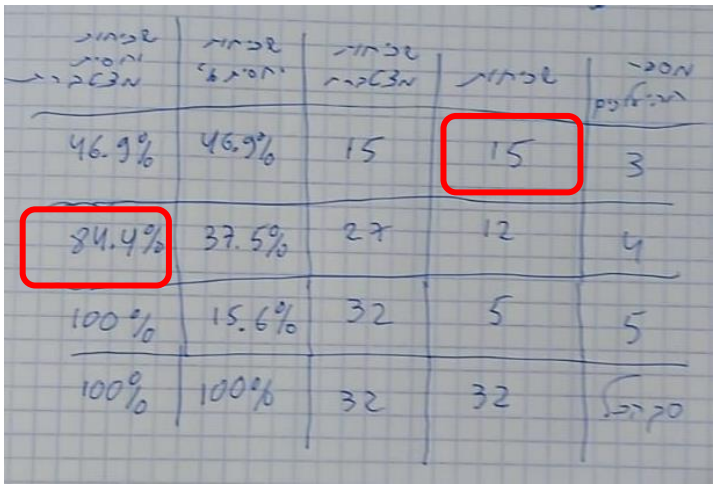
1	4	1
1	5	2
1	5	2
1	5	4
1	5	6
1	5	8
1	4	2

Average: 0.40625 Count: 32 Sum: 13

תיאור משתנה בסולם סדר – מספר ההילוכים (gear)

השכיח

החציון



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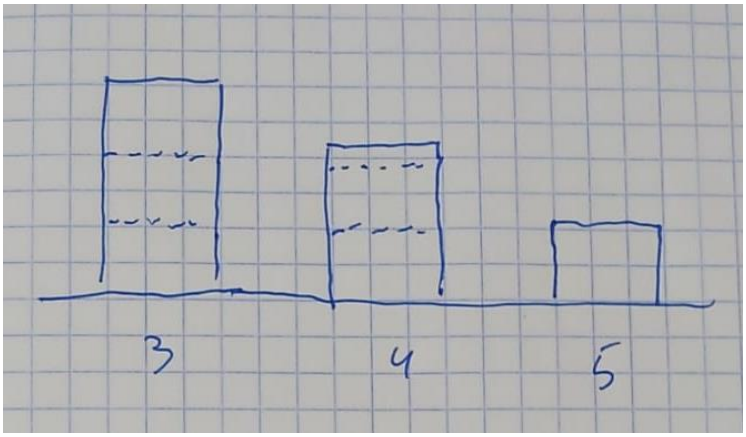
תיאור משתנה בסולם סדר – מספר ההילוכים (gear)

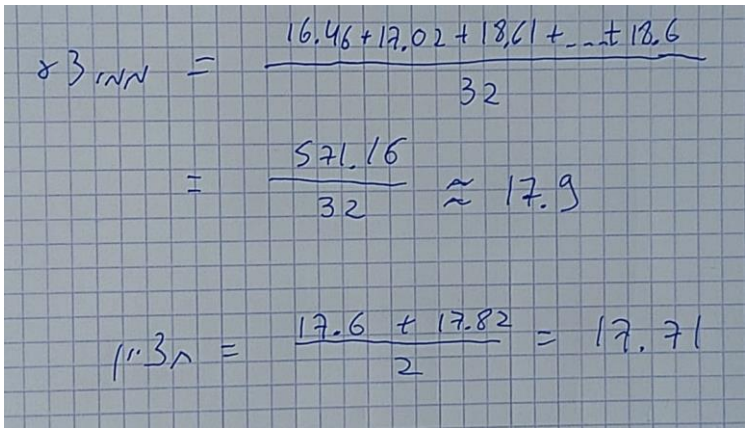


תיאור משתנה כמותי – qsec – ממוצע וחציון

	H
1	qsec
2	14.5
3	14.6
4	15.41
5	15.5
6	15.84
7	16.46
8	16.7
9	16.87
10	16.9
11	17.02
12	17.02
13	17.05
14	17.3
15	17.4
16	17.42
17	17.6
18	17.82
19	17.98
20	18

mtcars

17	17.6
18	17.82



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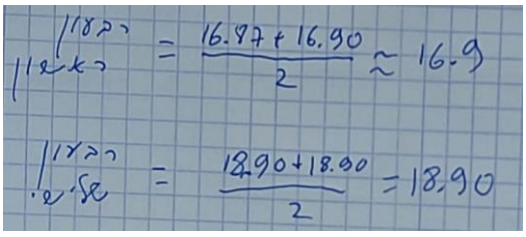
תיאור משתנה כמותי – qsec – השביח

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```


תיאור משתנה כמותי – qsec – רבעונים

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```



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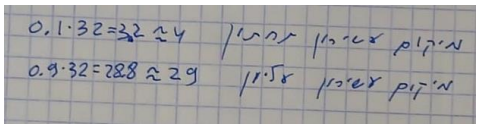
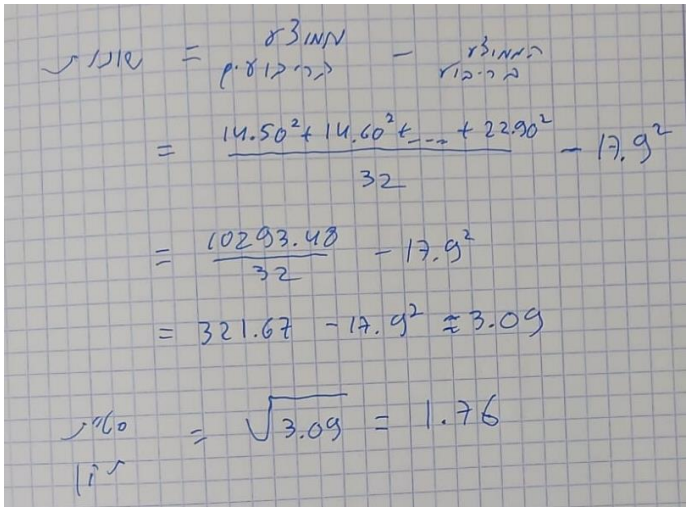
תיאור משתנה כמותי – qsec – עשירונים

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```



תיאור משתנה כמותי – qsec – מדדי פיזור יחסי

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```



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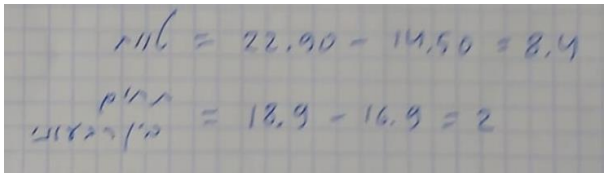
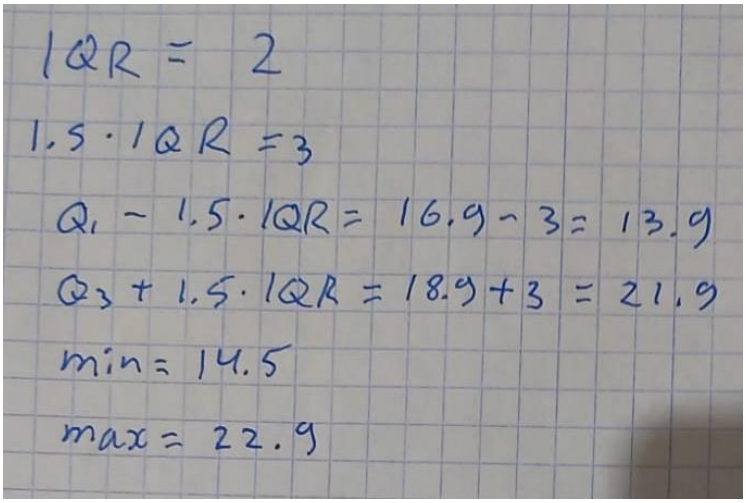
תיאור משתנה כמותי – qsec – מדדי פיזור מוחלט

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```



תיאור משתנה כמותי – דיאגרמת קופסה וזיהוי חריגים



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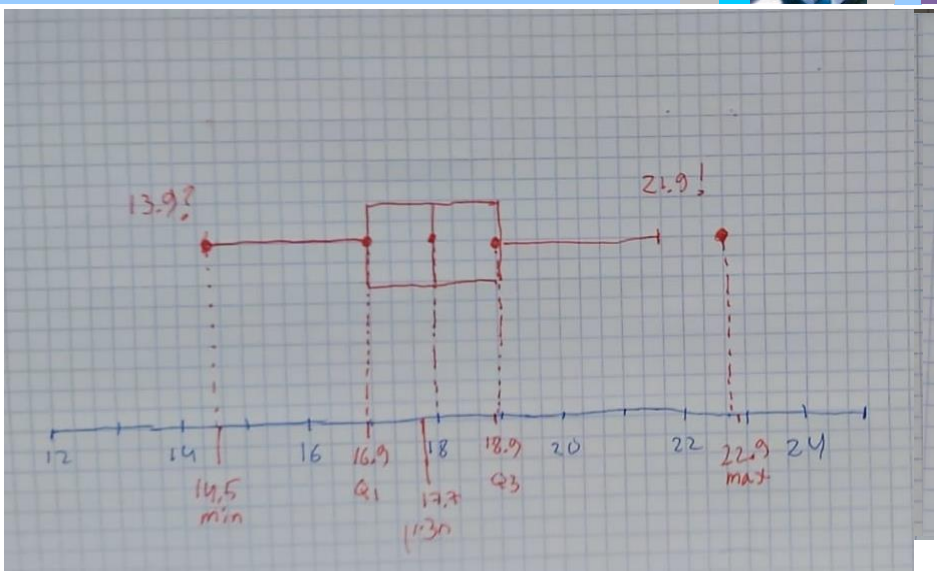
תיאור משתנה כמותי – דיאגרמת קופסה וזיהוי חריגים



תיאור משתנה כמותי – זיהוי חריגים בעזרת ציוני תקן

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```

$$\frac{14.5 - 17.9}{1.76} \approx -1.93 > -2$$

$$\frac{22.90 - 17.9}{1.76} \approx 2.84 > 2$$

$$\frac{20.22 - 17.9}{1.76} = 1.318 < 2$$

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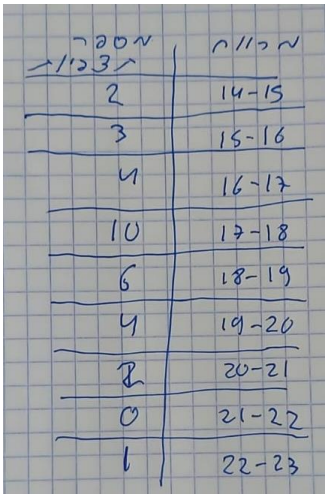
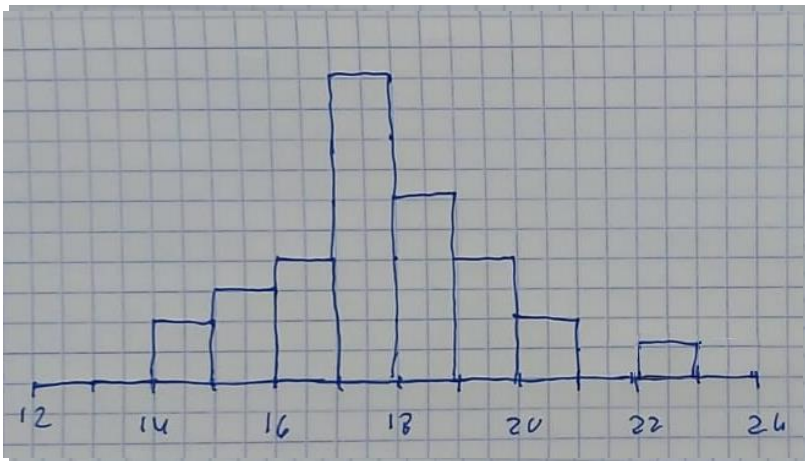
תיאור משתנה כמותי – היסטוגרמה

```
> sort(mtcars$qsec)
 [1] 14.50 14.60 15.41 15.50 15.84
 [6] 16.46 16.70 16.87 16.90 17.02
[11] 17.02 17.05 17.30 17.40 17.42
[16] 17.60 17.82 17.98 18.00 18.30
[21] 18.52 18.60 18.61 18.90 18.90
[26] 19.44 19.47 19.90 20.00 20.01
[31] 20.22 22.90
>
```



תיאור משתנה כמותי – היסטוגרמה



צורת ההתפלגות קרובה לסימטרית עם ערך קיצון גבוה אחד

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