

DESCRIPTIVE STATISTICS EXERCISES

- ① Consider the classification of the heights of a sample of 90 Dawson male students shown to the right.

HEIGHT (nearest cm.)	NUMBER OF STUDENTS
140 - 149	5
150 - 159	13
160 - 169	49
170 - 179	17
180 - 189	6

- (a) Draw the frequency histogram for the data.
 (b) Draw the cumulative frequency polygon also.

- ② Consider the classification of the years of seniority of a sample of 50 CEGEP teachers shown to the right.

SENIORITY (YEARS)	NUMBER OF TEACHERS
0 - 2	2
3 - 5	5
6 - 8	11
9 - 11	19
12 - 14	9
15 - 17	4

- (a) Draw the relative frequency polygon for the data.
 (b) Draw the cumulative relative frequency polygon.

- ③ The following are the miles per gallon obtained with 40 tankfuls of gas:

24.1 25.0 24.8 24.3 24.2 25.3 24.2 23.6 24.5 24.4
 24.5 23.2 24.0 23.8 23.8 25.3 24.5 24.6 24.0 25.2
 25.2 24.4 24.7 24.1 24.6 24.9 24.1 25.8 24.2 24.2
 24.8 24.1 25.6 24.5 25.1 24.6 24.3 25.2 24.7 23.3

- (a) Construct the complete Frequency Distribution Table for the data, using 6 classes.
 (b) Draw the frequency histogram for the data.
 (c) Draw the relative frequency polygon for the data.
 (d) Draw the cumulative relative frequency polygon for the data.

- ④ From the classification of 20 observations shown here, find:

- (a) the number of decimal places the observations have.
 (b) the lower and upper boundaries of the 3rd class.
 (c) the midpoint of the 4th class.
 (d) the frequency of the 2nd class.
 (e) the relative frequency of the 4th class.

CLASS	CLASS LIMITS	CFf
1	10.0 - 14.9	0.10
2	15.0 - 19.9	0.35
3	20.0 - 24.9	0.75
4	25.0 - 29.9	0.95
5	30.0 - 34.9	1.00

DESCRIPTIVE STATISTICS EXERCISES

- ⑤ Consider the 9 measurements that are recorded below:

59.6, 53.7, 39.5, 75.5, 26.2, 30.7, 68.8, 51.2, 42.8

Calculate the mean, median, and standard deviation of these 9 measurements.

- ⑥ Calculate the mean, median, mode, and standard deviation for the following sample of class test scores: 41, 18, 25, 30, 49, 35, 11, 50, 36, 46, 34, 36

- ⑦ Consider the following daily profit figures for 20 Montreal newsstands:

81.32	61.47	64.90	70.88	76.02	75.41	64.21
74.92	77.56	58.01	68.05	73.37	76.73	65.43
74.76	76.51	65.10	76.02	75.06	59.41	

Find the mean, median, mode, and standard deviation of the figures.

- ⑧ Consider the numbers of children in 50 completed families given below.

children/family	0	1	2	3	4	5	6	7
# of families	9	7	12	9	5	6	0	2

Regarding the number of children/family, what is the mean, median, and mode?

- ⑨ Find the mean, median, mode, and standard deviation for the following classification of the ages of university students:

Age	20	21	22	23	24	25
# of students	2	20	35	19	10	6

- ⑩ Consider the following grades from 2 sections of a Statistics course:

SECTION I			
70	80	77	70
63	66	75	68
72	69	65	71
60	67	74	68
72	73	70	70

SECTION II			
90	70	77	74
55	85	82	63
70	61	67	67
70	75	70	79
58	50	72	65

Calculate and COMPARE the mean, median, mode, and standard deviations of the 2 sections.

DESCRIPTIVE STATISTICS EXERCISES

- ⑪ Given that $\bar{X} = 10$ and $\sum_{i=1}^{25} X_i^2 = 3100$ for a sample of 25 observations, find S .
- ⑫ If the average age of the Dawson basketball team was 18 years, with a standard deviation of 0 years, what could we conclude about the team?
- ⑬ If the scores for a test are changed by:
 (a) adding 10 points to each score, and (b) increasing each score by 10%,
 what effect will these changes have on \bar{X} and S ?
- ⑭ A study of teachers' annual salaries in Québec reported that samples of 100 elementary, 150 high school, and 80 CEGEP teachers averaged \$44,000, \$47,000, and \$50,000 respectively. What is the overall average salary of these teachers?
- ⑮ An elevator is designed for a maximum load of 2000 lbs. Is it overloaded, if at one time it carries 8 women whose mean weight is 123 lbs. and 5 men whose mean weight is 174 lbs.?
- ⑯ Last term the mean grade for a class of 100 students was 80. If the mean grade of the 60 boys in the class was 70, what was the mean grade of the girls in the class?
- ⑰ Consider the classification to the right of the hourly rates (in dollars) charged by 40 Montréal lawyers.

HOURLY RATES	NUMBER OF LAWYERS
\$40 - \$49	4
50 - 59	7
60 - 69	18
70 - 79	9
80 - 89	2

⑱

CLASS LIMITS	f
3 - 5	2
6 - 8	10
9 - 11	12
12 - 14	9
15 - 17	7

Consider the table at the left giving the frequency distribution for the number of house sales made last month by 40 Montréal real estate agents.
 Estimate \bar{X} and S .

DESCRIPTIVE STATISTICS EXERCISES

- (19) Consider the classification to the right of the ages of a sample of 150 NHL players.

Estimate \bar{X} and S .

AGES (YEARS)	# OF PLAYERS
17 - 19	5
20 - 22	63
23 - 25	39
26 - 28	24
29 - 31	17
32 - 34	2

(20)

BOOKS LOANED	NUMBER OF DAYS
100 - 119	3
120 - 139	6
140 - 159	13
160 - 179	7
180 - 199	2

Consider the classification to the left of the number of books loaned per day by a college library for a recent month.

Estimate \bar{X} and S .

- (21) Incomes in a certain city are known to have a bell-shaped distribution. If the mean income is \$18,000 with a standard deviation of \$2,000, then what percentage of the city's wage earners

- earn more than \$22,000?
- earn less than \$20,000?
- earn between \$16,000 and \$22,000?

- (22) Recently, 600 students wrote an aptitude test, yielding $\bar{X} = 325$ and $S = 75$. If the distribution of the test scores was bell-shaped, then (approximately) how many of the students

- scored less than 250?
- scored more than 475?

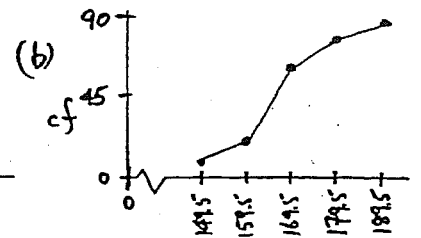
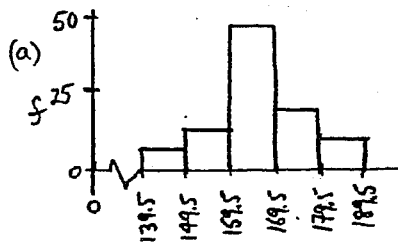
- (23) A tire manufacturer claims that his tires will last an average of 12,400 miles (with $S = 1800$). He guarantees to replace free any tire lasting less than 8800 miles. Assuming a bell-shaped life distribution, if he sells 10,000 of these tires to a large taxi fleet, (approximately) how many will he have to replace free?

- (24) For the data in exercises (3) and (7) above, determine P_{10} , P_{90} , Q_1 , Q_2 , and Q_3 for each sample.

DESCRIPTIVE STATISTICS EXERCISES - SOLUTIONS

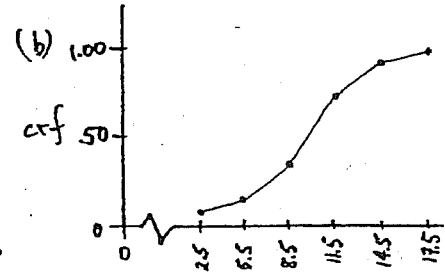
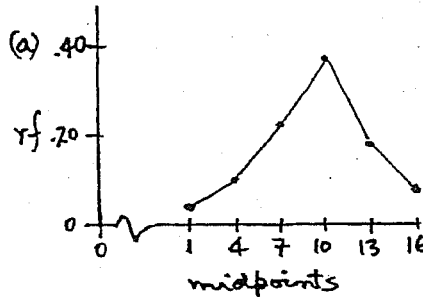
① i)

Boundaries	f	cf
139.5-149.5	5	5
149.5-159.5	13	18
159.5-169.5	49	67
169.5-179.5	17	84
179.5-189.5	6	90



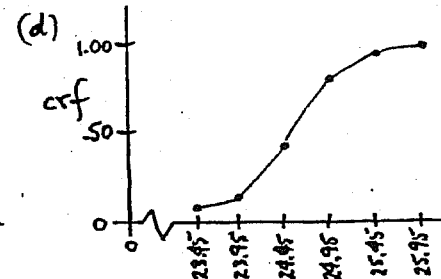
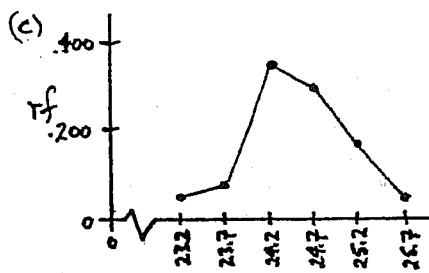
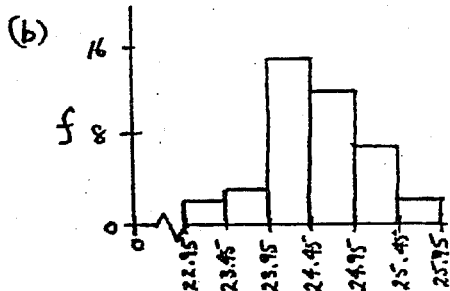
② i)

Boundaries	f	rf	cf	crf
-0.5-2.5	2	.04	2	.04
2.5-5.5	5	.10	7	.14
5.5-8.5	11	.22	18	.36
8.5-11.5	19	.38	37	.74
11.5-14.5	9	.18	46	.92
14.5-17.5	4	.08	50	1.00



③ (a)

Limits	Boundaries	Midpoints	f	rf	cf	crf
23.0-23.4	22.95-23.45	23.2	2	.050	2	.050
23.5-23.9	23.45-23.95	23.7	3	.075	5	.125
24.0-24.4	23.95-24.45	24.2	14	.350	19	.475
24.5-24.9	24.45-24.95	24.7	12	.300	31	.775
25.0-25.4	24.95-25.45	25.2	7	.175	38	.950
25.5-25.9	25.45-25.95	25.7	2	.050	40	1.000



④ (a) one

(b) 19.95-24.95

(c) 27.45

(d) $(.35 - .10)20 = 5$

(e) $.95 - .75 = .20$

⑤ $\bar{x} = \frac{448}{9}$

$\therefore \bar{x} = 49.77$

$\tilde{x} = 51.2$

$S = 16.63$

$(\sum x^2 = 24512)$

⑥ $\bar{x} = \frac{411}{12} = 34.25$

$\tilde{x} = \frac{35+36}{2} = 35.5$

Mode = 36

$S = 11.92$

$(\sum x^2 = 15641)$

⑦ $\bar{x} = \frac{1415.14}{20} = 70.76$

$\tilde{x} = \frac{73.37+74.76}{2} = 74.07$

Mode = 76.02

$S = 6.82$

$(\sum x^2 = 101,015.82)$

DESCRIPTIVE STATISTICS EXERCISES - SOLUTIONS

⑧ $\bar{x} = \frac{9(0) + 7(1) + 12(2) + \dots + 2(7)}{50}$
 $\therefore \bar{x} = \frac{122}{50} = 2.44$
 $\tilde{x} = 2$ and Mode = 2

⑨ $\bar{x} = \frac{2(20) + 20(21) + \dots + 6(25)}{92}$ and $S = 1.19$
 $\therefore \bar{x} = \frac{2057}{92} = 22.36$ ($\sum x^2 = 46121$)
 $\tilde{x} = 22$ and Mode = 22

⑩ All 70 except
 $S_1 = 4.68$ and
 $S_2 = 9.96$

⑪ $\sum x_i = 25(10)$
 $\therefore \sum x_i = 250$
 $\therefore S = 5$

⑫ All age 18
 EG

	1,2,3	11,12,13	11,2,2,3,3
\bar{x}	2	12	2.2
S	1	1	1.1

⑭ $\bar{x} = \frac{100(44000) + 150(47000) + 80(50000)}{330}$
 $\therefore \bar{x} = \frac{15450000}{330} = \46818.18

⑮ $\sum \text{total} = 8(123) + 5(174)$
 $= 1854$
 \therefore Not overloaded

⑯ $\frac{\sum X_F + 60(70)}{100} = 80$
 $\therefore \sum X_F = 3800$
 $\therefore \bar{x}_F = \frac{3800}{40} = 95$

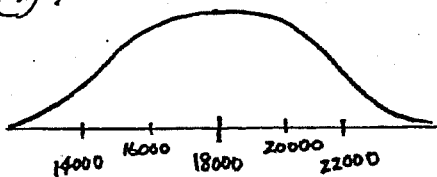
⑰ (a) $\frac{4}{40} = .10 = 10\%$ (b) $\frac{18+9+2}{40} = \frac{29}{40} = .725 = 72.5\%$
 (c) $\bar{x} \approx \frac{4(44.5) + 7(54.5) + 18(64.5) + 9(74.5) + 2(84.5)}{40}$
 $\therefore \bar{x} \approx \frac{2560}{40} = 64$

⑱ $\sum f_i M_i = 427$ and $\sum f_i M_i^2 = 5035$
 $\therefore \bar{x} \approx 10.675$
 $\therefore S \approx 3.496$

⑲ $\sum f_i M_i = 3573$ and $\sum f_i M_i^2 = 86841$
 $\therefore \bar{x} \approx 23.82$ and $S \approx 3.41$

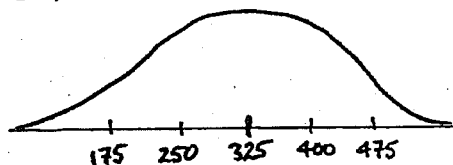
⑳ $\sum f_i M_i = 4614.5$ and $\sum f_i M_i^2 = 700077.75$
 $\therefore \bar{x} \approx 148.85$ and $S = 20.97$

⑳ *ip*



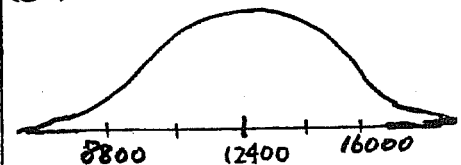
- (a) 2.5%
- (b) 84%
- (c) $34\% + 47.5\% = 81.5\%$

㉑ *ip*



- (a) $600 \times (0.16) = 96$
- (b) $600 \times (0.025) = 15$

㉒ *ip*



$\therefore \text{ANS.} = 10000 \left(\frac{0.05}{2}\right)$
 $= 10000(0.025) = 250$

㉓ For Exercise ③: $P_{10} = 23.8, P_{90} = 25.3, Q_1 = 24.1, Q_2 = 24.5,$ and $Q_3 = 24.9$

For Exercise ④: $P_{10} = 61.47, P_{90} = 77.56, Q_1 = 65.10, Q_2 = 74.76,$ and $Q_3 = 76.02$