1(a)

We construct the following table:

Miles Driven	Mid value (x_i)	No of Owners (f_i)	d_i	$f_i d_i$
0-5	2.5	7	-4	-28
5-10	7.5	26	-3	-78
10-15	12.5	59	-2	-118
15-20	17.5	71	-1	-71
20-25	22.5→A	62	0	0
25-30	27.5	39	1	39
30-35	32.5	22	2	44
35-40	37.5	14	3	42
		N= 300		$\Sigma f_i d_i$ = -170

Here, Assumed mean, A = 22.5

Class difference, h = 5

We knows,

Mean, $\bar{x} = A + \dfrac{\Sigma f_i d_i}{N} \times h$

$= 22.5 + \dfrac{-170}{300} \times 5$

$= 19.67$

1(b)

We construct the following table:

Age (years) of users	Hours per week (f_i)	Cumulative Frequency
10-15	3	3
15-20	7	10
20-25	16	26
25-30	12	38
30-35	9	47
35-40	5	52
40-45	3	55
	N = 55	

Here, Median is $\frac{N}{2} = \frac{55}{2} = 27.5 \approx 28^{th}$ observation. 28th observation lies in 25-30 class. So, median class is 25-30. $L = 25$, $P.cf = 26$, $h = 5$, $f = 12$.

We know, Median $= L + \dfrac{\frac{N}{2} - P.c.f}{f} \times h$

$= 25 + \dfrac{27.5 - 26}{12} \times 5$

$= 25.625$.

Here, the highest frequency is 18 which lies in class 20-25. So, modal class is 20-25.

We know,

$$\text{Mode} = L + \frac{\Delta_1}{\Delta_1 + \Delta_2} \times h$$

$$= 20 + \frac{9}{9+4} \times 5$$

$$= 23.46.$$

$\Delta_1 = 16 - 7 = 9$

$\Delta_2 = 16 - 12 = 4$

$L = 20$

$h = 5$

(2)

We construct following table:

X(mins.)	Mid value (x_i)	(f_i)	d_i	$f_i d_i$	$f_i d_i^2$
0-20	10	14	-2	-28	56
20-40	30	18	-1	-18	18
40-60	50→A	9	0	0	0
60-80	70	5	1	5	5
80-100	90	4	2	8	16
		50		$\Sigma f_i d_i = -33$	$\Sigma f_i d_i^2 = 95$

We know,

Standard deviation, $S.D = h \times \sqrt{\frac{\Sigma f_i d_i^2}{N} - \left(\frac{\Sigma f_i d_i}{N}\right)^2}$ $h = 20$

$$= 20 \sqrt{\frac{95}{50} - \left(\frac{-33}{50}\right)^2}$$

$$= 24.20$$

Hence, variance from emperical relation,

$$\sigma^2 = (24.20)^2 = 585.64.$$