e. 75^{th} PERCENTILE:

From the above graphs it can be observed that the 75^{th} percentile is start on Y-axis at 75 and the values corresponding to X-axis value is 504 Therefore, the values at 75^{th} percentile is $\boxed{504}$

Q6.

a. Since, the standard deviation of statistics which is 8 is greater than the standard deviation of algebra which is 7.6. So statistics has a higher absolute dispersion than algebra.

Coefficient of variation for statistics:

$$C\,Var = \frac{S}{\overline{X}} = \frac{8}{78} = 0.1026$$

Coefficient of variation for algebra:

$$C\,Var = \frac{S}{\overline{X}} = \frac{7.6}{73} = 0.1041$$

Since, the coefficient of variation for algebra which is 0.1041 is greater than coefficient of variation for statistics which is 0.1026. So Algebra has a higher relative dispersion than Statistics.

b. Student's Final Average = $\frac{20 \times 83 + 30 \times 72 + 50 \times 90}{100}$

$$= \frac{1660 + 2160 + 4500}{100} = \frac{8320}{100}$$

$$= 83.2$$

Q7. Mean Deviation About Median:

Class Interval	Frequency f_i	Cumulative Frequency	Class Midpoints x_i	Deviation $d_i = \lvert x_i - M \rvert$	$f_i \cdot d_i$
10-20	15	15	15	17	255
20-30	25	40	25	7	175
30-40	20	60	35	3	60
40-50	12	72	45	13	156
50-60	8	80	55	23	184
60-70	5	85	65	33	165
70-80	3	88	75	43	123
	$\Sigma f_i = 88$				$\Sigma f_i d_i = 1124$

Now we calculate median,

Here $N = 88$, $\frac{N}{2} = 44$

Cumulative Frequency is 60

& Corresponding class is 30 - 40

$\therefore$ $L = 30$, $f = 20$, Cumulative Frequency Before Median Class $F = 40$, $h = 10$, $\frac{N}{2} = 44$

$$\text{Median} = L + \left[\frac{\frac{N}{2} - F}{f}\right] \times h = 30 + \left[\frac{44 - 40}{20}\right] \times 10$$

$$= 32$$

Let calculate $x_i - \bar{x}$ & $f_i d_i$ for first class interval 10 - 20

$\therefore (x_i - M) = 15 - 32 = -17$

$\therefore |x_i - M| = 17$

& $f_i \cdot d_i = 15 \times 17 = 255$

Similarly we will calculate all values for all class interval in table
Now we calculate Mean deviation about Median,

$$\text{Mean Deviation About median} = \frac{\Sigma f_i d_i}{N} = \frac{1124}{88}$$

$$\boxed{= 12.77}$$

Q8. Mean Deviation About Mean:

Class Interval	Frequency f_i	Class Midpoint x_i	$f_i . x_i$	Deviation $d_i = \|x_i - M\|$	$f_i . d_i$
10 - 20	15	15	225	20	300
20 - 30	25	25	625	10	250
30 - 40	20	35	700	0	0
40 - 50	12	45	540	10	120
50 - 60	8	55	440	20	160
60 - 70	5	65	325	30	150
70 - 80	3	75	225	40	120
	$\Sigma f_i = 88$		$\Sigma f_i x_i = 3080$		$\Sigma f_i . d_i = 1100$

$$\therefore \text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{3080}{88} = 35$$

$\therefore$ Deviation $|x_i - M|$ & $f_i |x_i - M|$ for first class interval 10 - 20 is

$|x_i - M| = |15 - 35| = 20$

$f_i\,|x_i - M| = 15 \times 20 = 300$

$\therefore$ MEAN DEVIATION ABOUT MEAN $= \dfrac{\sum f_i\,|x_i - M|}{N} = \dfrac{1100}{88} = 12.5$

MEAN DEVIATION ABOUT MEAN $\boxed{= 12.5}$

Q9. For National League:

X_m	f	$f.X_m$	$f.X_m^2$
0.244	3	0.732	0.178
0.249	6	1.494	0.372
0.254	1	0.254	0.064
0.259	11	2.849	0.737
0.264	11	2.904	0.766
0.269	1	0.269	0.072
	$\sum f = 33$	$\sum = 8.502$	$\sum f.X_m^2 = \boxed{2.192}$

$$S^2 = \frac{n(\sum f.X_m^2) - [\sum f.X_m]^2}{n\,(n-1)} = \frac{33(2.192) - (8.502)^2}{33(33-1)}$$

$$= \frac{72.337 - 72.284}{1056} = \frac{0.053}{1056} = 0.00005042$$

$S = \sqrt{0.00050} \boxed{= 0.0071}$

FOR AMERICAN LANGUAGE:

X_m	f	$f.X_m$	$f.X_m^2$
0.2465	3	0.7395	0.1822
0.2525	6	1.515	0.3825
0.2585	2	0.517	0.1336
0.2645	1	0.2645	0.0699
0.2705	3	0.8115	0.21951
0.2765	0	0	0
	$\Sigma f = 15$	$\Sigma = 3.8475$	$\Sigma = 0.9877$

$$S^2 = \frac{n\,[f.x_m) - [f.x_m)^2}{n(n-1)} = \frac{14.819 - 14.803}{210} = \frac{0.01584}{210}$$

$$S^2 = 0.000075$$

$$S = \sqrt{0.00075} = 0.0086$$

So, we see that variability of NL is less which mean that NL batting averages are more consistent

Q10.

For observers:

$$\overline{X} : \frac{\Sigma x}{n} = \frac{3804}{10} = 380.4$$

MEDIAN : $\frac{352 + 378}{2} = 365$

MODE : NO MODE

MEDIAN RANGE : $\frac{484 + 302}{2} = 393$

For Visits:

$$\overline{X} : \frac{\Sigma \overline{X}}{n} = \frac{2769}{10} = 276.9$$

MEDIAN: $\frac{194 + 219}{2} = 206.5$

MODE: No MODE

MEDIAN RANGE: $\frac{114 + 632}{2} = 374$

The values are higher for observers

Q11. For Temperatures:

RANGE: $61 - 29 = 32$

MEAN: $\bar{x} = \frac{50+37+29+54+30+61+47+38+34+61}{10} = \frac{441}{10} = 44.1$

VARIANCE: $S^2 = \frac{n(\Sigma x^2) - (\Sigma x)}{n(n-1)} = \frac{10(20777) - (441)^2}{10(10-1)} = 147.7$

STANDARD DEVIATION: $S = \sqrt{147.7} = 12.1514$

COEFFICIENT OF VARIATION: $C.V_{AR} = \frac{S}{\bar{x}} = \frac{12.1514}{44.1} = 0.2755$

FOR PRECIPITATION:

RANGE: $5.1 - 1.1 = 4.0$

MEAN: $\bar{x} = \frac{4.8+2.6+1.5+1.8+1.8+3.3+5.1+1.1+1.8+2.5}{10} = \frac{26.3}{10}$

$\bar{x} = 2.63$

VARIANCE: $\frac{n(\Sigma x^2) - (\Sigma x)^2}{n(n-1)} = \frac{10(86.15) - (26.3)^2}{10(10-1)} = 1.88$

STANDARD DEVIATION: $SD = s = \sqrt{1.9} = 1.3728$

COEFFICIENT OF VARIATION: $CVar = \frac{s}{\bar{x}} = \frac{1.372}{2.63} = 0.52$

COMPARE:

Dialy High Temperrature are more Variable, because all measure of variation are higher for daily high tempenture

Q12. WEIGHTED MEAN

$$\bar{X} = \frac{\Sigma f \cdot X}{\Sigma f} = \frac{9(427000) + 6(365000) + 12(725000)}{9+6+12}$$

$$\bar{X} = \frac{14\,733\,000}{27}$$

$$\boxed{\bar{X} = \$\ 545,666.67}$$