

S270 Homework 1 Answers Spring 2010 – Prof. W. E. Becker

2.34

In this case, it is possible to compute the exact value of the mean, which is 156.4286 minutes. The median and mode cannot be calculated exactly. Approximation of the median is 182 minutes. Similarly, the standard deviation cannot be calculated exactly because we do not have the actual 84 values. Approximation sample standard deviation is 215.72515 minutes.

	Mean	Freq.	Mean * Freq	(Midpoint-Mean)^2*freq	
Emery Worldwide	91	12	1092	51455.65083	
Federal Express	104	12	1248	33053.07963	
Airborne Express	120	12	1440	15971.76123	
DHL Worldwide	182	12	2184	7813.652433	
Purolator Courier	192	12	2304	15137.82843	
U.S. Postal Service	195	12	2340	17803.08123	
United Parcel Service	211	12	2532	35665.76283	
SUM		84	13140	2056891.545	
		Mean	156.5 minutes	176900	SUM
				46.17	Std. d

Note: the sample standard deviation cannot be calculated correctly using the descriptive statistics function in Excel because there are 84 observations. There are 7 “classes” but each class has 12 observations.

2.35

The exact mode cannot be found, but the modal class is 65-74 words per minute.

- a. The exact median cannot be determined because the actual data values are unknown. An approximate median is $65 + [25-20]/15(74-65) = 68$ words per minute.

c), d), e) The following table provides an approximate mean (words per minute), variance (squared words per minute), and the standard deviation (words per minute). There are approximate because the actual data values are unknown.

Midpoint	Frequency	Midpoint * Frequency	(midpoint - mean)^2	(midpoint - mean)^2 * freq
39.5	1	39.5	887.7967515	887.7967515
49.5	7	346.5	391.8783841	2743.148689
59.5	12	714	95.96001671	1151.520201
69.5	15	1042.5	0.041649312	0.624739676
79.5	6	477	104.1232819	624.7396915
89.5	3	268.5	408.2049145	1224.614744
99.5	4	398	912.2865471	3649.146188
109.5	1	109.5	1616.36818	1616.36818
	sum	3395.5	Sum	11897.95918
	mean	69.29591837	Variance	247.8741497
			std. dev.	15.74401949

- f. At most, the range is $114-35 = 79$
- g. There are $1+7+12 = 20$ workers who type 64 or fewer words per minute. Because the total is 49, the proportion of such workers is $20/49 = .408$, or 40.8%.
- h. For the calculation of the mean, median, and range, it does not matter whether the data set is a sample or population. For the variance and the standard deviation, it matters, because in one case the division is by $n-1$ (sample), whereas in the other division is by N (population). This might be population data if we are interested only in the speed of these particular 49 workers. It will be sample if we are trying to infer something about the typing speed of a larger group of clerks by studying these 49.

