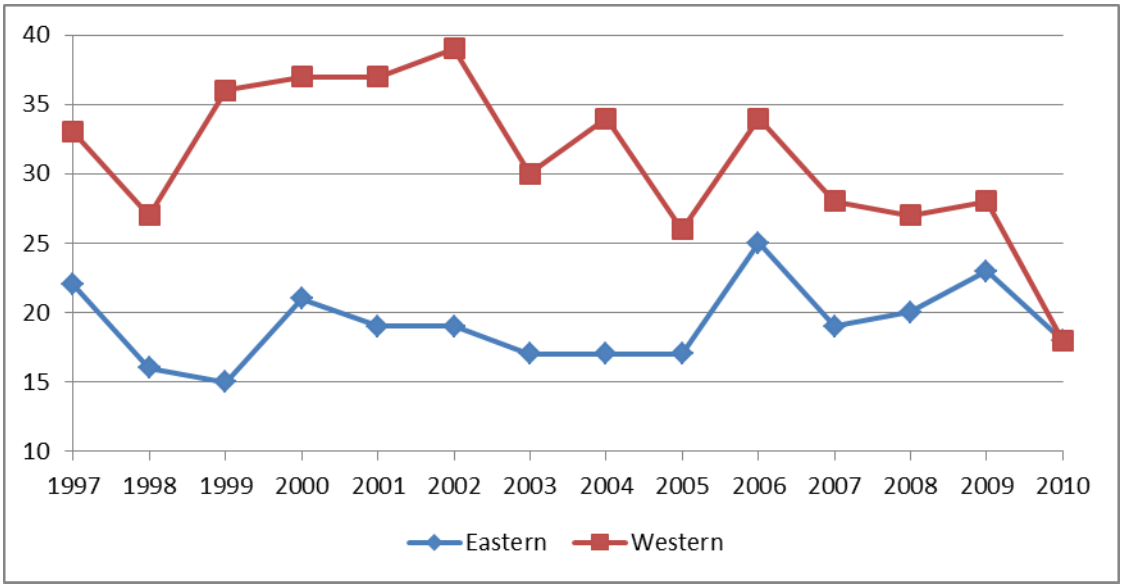
AP EXAM Review **Name _____KEY_____**
Free Response Ch 1, 3, 4 **Per ____**

Descriptive Statistics

1. Tropical storms in the Pacific Ocean with sustained winds that exceed 74 miles per hour are called typhoons. This graph displays the number of recorded typhoons in two regions of the Pacific Ocean – Eastern and Western – for the years from 1997 to 2010.



A) Compare the distributions of yearly frequencies of typhoons for the two regions of the Pacific Ocean for the years from 1997 to 2010.

Western Pacific has more typhoons than Eastern in every year studied.
Average of Western is around 30 per year, where as average for Eastern is around 20 per year.
As time went on, both Western and Eastern approached the same value, 18.

B) For each region, describe how the yearly frequencies changed over the time period from 1997 to 2010.

The Eastern frequencies slowly trended higher from an average in the teens to an average over 20.

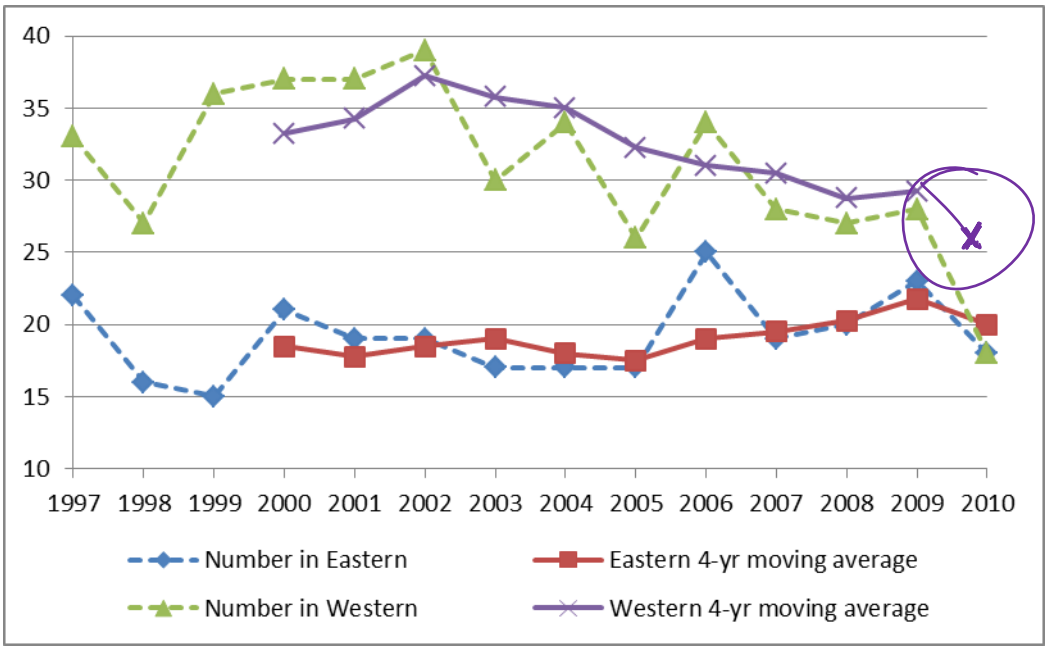
The Western frequencies was higher and more variable and trended lower from a high over 35 to below 20.

A moving average for data collected at regular time increments is the average of data values for two of more consecutive increments. The 4-year moving averages for the typhoon data are provided in the table below. For example, the Eastern Pacific 4-year moving average for 2000 is the average of 22, 16, 15, and 21 which equals 18.5.

Year	Number in Eastern	Eastern 4-yr moving average	Number in Eastern	Eastern 4-yr moving average
1997	22		33	
1998	16		27	
1999	15		36	
2000	21	18.50	37	33.25
2001	19	17.75	37	34.25
2002	19	18.50	39	37.25
2003	17	19.00	30	35.75
2004	17	18.00	34	35.00
2005	17	17.50	26	32.25
2006	25	19.00	34	31.00
2007	19	19.50	28	30.50
2008	20	20.25	27	28.75
2009	23	21.75	28	29.25
2010	18	20.00	18	

C) Show how to calculate the 4-year moving average for the year 2010 for the Western Pacific. Write your value in the box in the table. (28+27+28+18)/4 = 25.25

D) The graph below shows yearly frequencies (dashed lines) and 4-year moving averages (solid lines). Use your answer from #3 to complete the graph.



E) What information is more apparent from the plots of the 4-year moving average lines than from the individual yearly frequencies? Western is trending lower, Eastern is trending higher.

F) What information is less apparent from the plots of the 4-year moving average lines than from the individual yearly frequencies? The 4-year moving averages disguise the year to year variability and uncertainty.

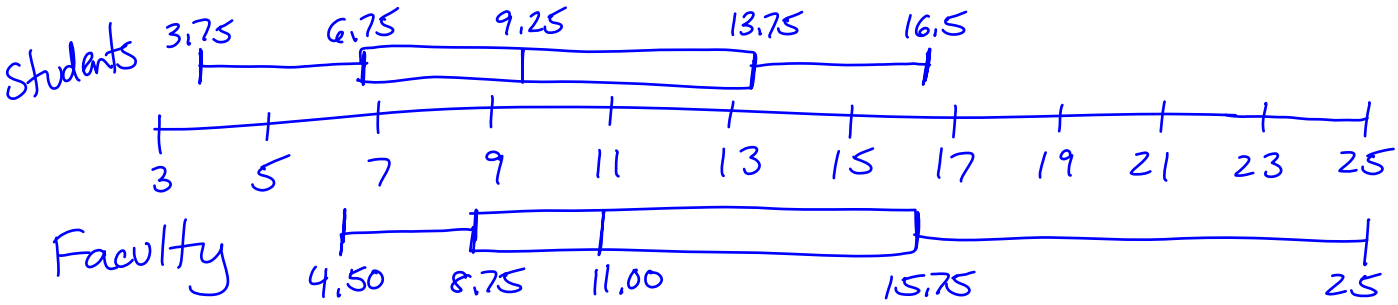
2. At a school field day, 50 students and 50 faculty members each completed an obstacle course. Descriptive statistics for the completion times (in minutes) for the two groups are shown below.

	Students	Faculty Members
Mean	9.90	12.09
Median	9.25	11.00
Minimum	3.75	4.50
Maximum	16.50	25.00
Lower quartile	6.75	8.75
Upper quartile	13.75	15.75

a. Use the same scale to draw boxplots for the completion times for students and for faculty members.

b. Write a few sentences comparing the variability of the two distributions.

c. You have been asked to report on this event for the school newspaper. Write a few sentences describing student and faculty performances in this competition for the paper.



The faculty distribution has more variability than students. The faculty has a range of 20.5 versus student range of 12.25. The faculty has an IQR of 7 and students have IQR of 7, both the same.
Almost 25% of faculty times are greater than all of student scores.

c) The students handily beat the faculty in this years obstacle course. Both the student's mean and median scores were about 2 seconds faster than faculty mean and median. The fastest time, of 3.5 sec, was posted by a student.

3. The summary statistics for the number of inches of rainfall in Los Angeles for 117 years, beginning in 1877, are shown below.

N	MEAN	MEDIAN	TRMEAN	STDEV	SE MEAN
117	14.941	13.070	14.416	6.747	0.624

MIN	MAX	Q1	Q3
4.850	38.180	9.680	19.250

a. Describe a procedure that uses these summary statistics to determine whether there are outliners.

b. Are there outliers in these data? _____
Justify your answer based on the procedure that you described in part a.

c. The news media reported that in a particular year, there were only 10 inches of rainfall. Use the information provided to comment on this reported statement.

a+b) First I find the IQR = Q3−Q1. Then multiply IQR by 1.5. An outlier is any point less than Q1−1.5*IQR or more than Q3+1.5*IQR.

IQR = Q3−Q1 = 19.25−9.68 = 9.57

1.5*IQR = 1.5(9.57) = 14.355

Q1−1.5(IQR) = 9.68−14.355 = −4.675 So no outlier.

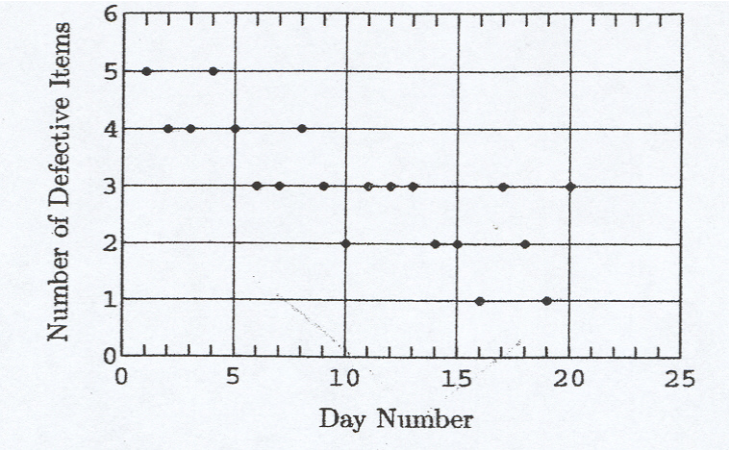
Q3+1.5(IQR) = 19.25+14.355 = 33.605 So at least one outlier on high side.

c) 10 inches falls in the 2nd Quartile (in the IQR) so that is Not unusual. I disagree with the implication only 10 in of rain.

OR $z = \frac{x-\mu}{\sigma} = \frac{10-14.941}{6.747} = -.732$

b/c this z score is less than ONE stdev from the mean, this is NOT unusual.

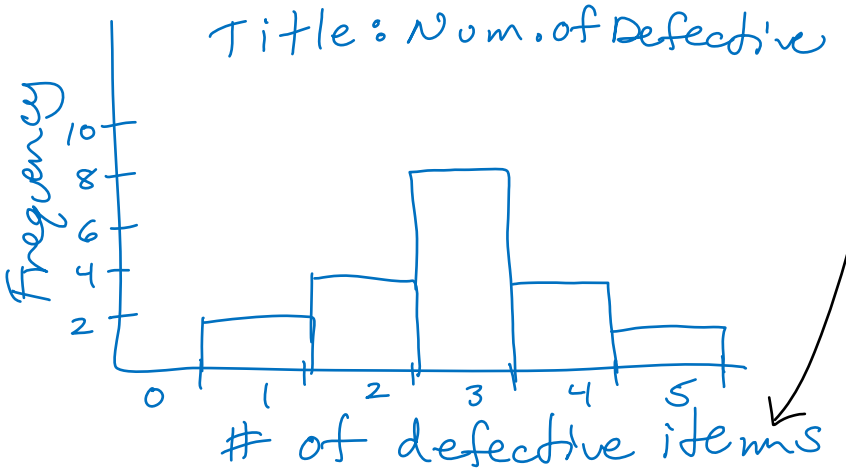
4. A plot of the number of defective items produced during 20 consecutive days at a factory is shown below.



a. Draw a histogram that shows the frequencies of the number of defective items.

b. Give one fact that is obvious from the histogram but is not obvious from the scatterplot.

c. Give one fact that is obvious from the scatterplot but is not obvious from the histogram.



b) Approximately Normal or symmetric

c) decreasing linear trend
- negative slope
- negative correlat
- neg. association