MIDDLE EAST TECHNICAL UNIVERSITY
FACULTY OF ENGINEERING

UNCERTAINTY and DATA ANALYSIS
Spring Semester 2009-2010

Homework No: 1 – Date Due: 11.03.2010 till 17:00

1) The world populations (WP) and the average annual world population changes (WPC) between the years 2000 and 2049 are summarized below table as taken from the Drexel University Database.

Year	Population (Billions)	Avg Annual Pop Change (Millions)
2000	6.091	78.770
2001	6.170	78.373
2002	6.248	77.936
2003	6.326	77.489
2004	6.403	77.020
2005	6.481	76.720
2006	6.557	76.614
2007	6.634	76.492
2008	6.710	76.349
2009	6.787	76.121
2010	6.863	75.959
2011	6.939	75.824
2012	7.015	75.461
2013	7.090	74.928
2014	7.165	74.269
2015	7.239	73.674
2016	7.313	73.168
2017	7.386	72.579
2018	7.459	71.926
2019	7.531	71.200
2020	7.602	70.532
2021	7.672	69.921
2022	7.742	69.220
2023	7.811	68.468
2024	7.880	67.675
2025	7.948	66.988
2026	8.015	66.410
2027	8.081	65.773
2028	8.147	65.125
2029	8.212	64.477
2030	8.276	63.840
2031	8.340	63.178
2032	8.403	62.398
2033	8.466	61.573
2034	8.527	60.749

2035	8.588	59.898
2036	8.648	58.982
2037	8.707	57.921
2038	8.765	56.800
2039	8.822	55.715
2040	8.877	54.632
2041	8.932	53.515
2042	8.986	52.271
2043	9.038	50.979
2044	9.089	49.754
2045	9.139	48.552
2046	9.187	47.329
2047	9.234	45.982
2048	9.280	44.562
2049	9.325	43.218

a) Draw histograms and cumulative frequency diagrams for ***the world populations (WP)*** and ***the average annual world population changes (WPC).***
b) Find the mean, median, mode, standard deviation and coefficient of variation for the variables WP and WPC.
c) Give your comments on the histograms and numerical descriptors that you have found in parts (a) and (b).
d) Are there any outliers in the data sets for WP and WPC? If there are, what would you suggest for a more robust statistical analysis?
e) Draw a scatter diagram for WP and WPC. (WP versus WPC) Are WP and WPC correlated? Find the correlation coefficient. Comment on your results.

Note : You may use any statistical software package for solving this problem. (e.g. Excel, Minitab, Matlab,…).

2) Last year's travel expenditures in Turkish Liras (TL) by the 12 members of a university's civil engineering department were as follows:

0 0 346 756 882 1466 1518 1714 1916 1970 2868 4126

a) Draw the relative frequency and cumulative frequency diagrams of last year's travel expenditures.
b) Find mean, median, mode, variance and standard deviation of last year's travel expenditures. Find the coefficient of variation. Comment on your results.
c) Are there any outliers in the data set? If so find them.

Note : Problem 2 is to be solved by hand.

3) Consider the following two sets of data:

A = (10, 9, 9, 10, 7, 6, 10, 6) and B = (11, 9, 8, 5, 9, 8, 8, 9).

Compare the ranges and standard deviations of both samples. Do they indicate the same variability?

Comment on the use of sample range and sample standard deviation as measures of variability.

You are expected to solve the assignments in the unique way of your own. Otherwise, your homework will not be graded. Do not forget that by doing the assignments on your own, you are gaining experience and building skills in report writing which you will definitely need in your professional life.