MGT 233 – Homework #1, Fall 2013

This homework assignment is due at the beginning of class on September 19, 2013.

Instructions: For each problem use the proper statistics notation, show the intermediate work, write the equation you are using, give the proper units of measure, and write clearly. When interpreting an answer do not tell about the procedure, instead write a proper English statement that explains the meaning of the answer with respect to the problem context.

Problem #1

Since 1934, the Masters have been played by the top golfers in history. The champions have varied and so have the final scores. The best score came in 2001 with Tiger Woods and in 2010 with Phil Mickelson shooting a score of 272 *strokes*. As of 2013, the champions scores over the past fourteen years have been:

(carry all work to 4 significant digits)

Year	Player	Score (strokes)
2000	Vijay Singh (Fiji)	278
2001	Tiger Woods (USA)	272
2002	Tiger Woods (USA)	276
2003	Mike Weir (Canada)	281
2004	Phil Mickelson (USA)	279
2005	Tiger Woods (USA)	276
2006	Phil Mickelson (USA)	281
2007	Zach Johnson (USA)	289
2008	Trevor Immelman (South Africa)	280
2009	Ángel Cabrera (Argentina)	276
2010	Phil Mickelson (USA)	272
2011	Charl Schwartzel (South Africa)	274
2012	Bubba Watson (USA)	278
2013	Adam Scott (Australia)	279

a) compute and interprete the mean
b) compute the range, median, and interquartile range
c) compute the variance
d) compute the standard deviation
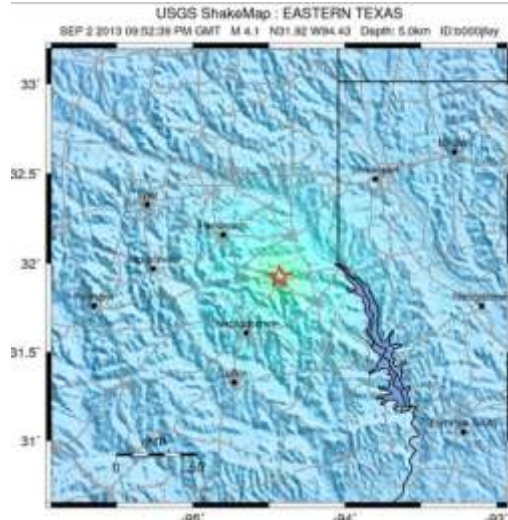e) compute the coefficient of variation for the scores.

Problem #2
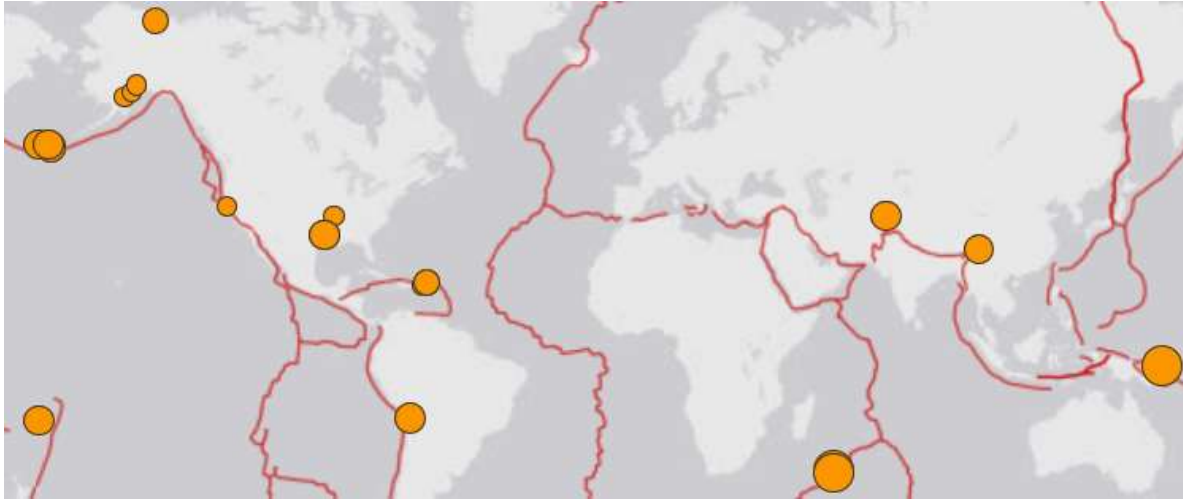
Most of North America east of the Rocky Mountains has infrequent earthquakes. Here and there earthquakes are more numerous, for example in the New Madrid seismic zone centered on southeastern Missouri, in the Charlevoix-Kamouraska seismic zone of eastern Quebec, in New England, in the New York - Philadelphia - Wilmington urban corridor, and elsewhere. However, most of the enormous region from the Rockies to the Atlantic can go years without an earthquake large enough to be felt, and several U.S. states have never reported a damaging earthquake. The earthquakes that do occur strike anywhere at irregular intervals.

Several significant earthquakes have occurred worldwide on the same day. The following table provides a sample of some of these earthquake magnitudes occurring in the previous 24 hour period which is attributed to September 3, 2013. Earthquake measurements are unitless. Use all 23 earthquake observations on the following table.

a) Compute the mean earthquake magnitude and the mean depth of the earthquakes
b) Compute the magnitude interquartile range
c) Compute the magnitude sample variance
d) Compute the magnitude sample standard deviation
e) Find the magnitude coefficient of variation

A sample of earthquakes from September 3, 2003 (ten years earlier) provided a sample mean of 4.3 and a sample standard deviation of 1.23. Based on these descriptive statistics, what comparisons can you make between the earthquakes occurring on September 3, 2013 and September 3, 2003?

USGS ShakeMap : EASTERN TEXAS
SEP 2 2013 09:52:39 PM GMT M 4.1 N31.92 W94.43 Depth: 5.0km ID:b000jday

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.007	0.08	1.0	5.0	8.8	15	27	47	>83
PEAK VEL.(cm/s)	<0.003	0.04	0.5	3.0	6.5	14	30	63	>136
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Atkinson & Kaka, 2007

UTC Date-Time	Latitude	Longitude	Magnitude	Depth (km)	Region
9/3/13 12:26	61.353	-149.718	2.8	13.1	17km NNE of Anchorage, Alaska
9/3/13 10:31	19.573	-64.262	3.1	33.0	133km NNE of Road Town, British Virgin Islands
9/3/13 9:29	19.590	-64.310	3.8	29.0	133km NNE of Road Town, British Virgin Islands
9/3/13 8:56	51.548	-175.482	4.2	26.6	89km ESE of Adak, Alaska
9/3/13 6:18	60.400	-151.047	2.5	57.8	9km S of Soldotna, Alaska
9/3/13 6:00	-20.771	-178.672	4.4	593.7	13km SSE of Ndoi Island, Fiji
9/3/13 2:16	18.903	-65.237	2.9	10.0	66km N of Culebra, Puerto Rico
9/3/13 1:03	-34.298	56.188	5.3	13.3	South Indian Ocean
9/3/13 0:54	51.426	-175.182	2.6	34.0	109km SW of Atka, Alaska
9/3/13 0:41	-33.810	56.191	5.3	13.7	Southwest Indian Ridge
9/2/13 23:51	31.917	-94.424	4.3	5.0	3km WNW of Timpson, Texas
9/2/13 23:39	69.271	-144.201	3.6	6.8	98km SSW of Kaktovik, Alaska
9/2/13 22:48	51.442	-178.356	4.9	50.7	51km SSW of Tanaga Volcano, Alaska
9/2/13 21:52	31.924	-94.431	4.1	5.0	4km WNW of Timpson, Texas
9/2/13 21:07	51.185	-175.250	4.5	25.0	124km SE of Adak, Alaska
9/2/13 21:00	-4.763	153.082	5.0	50.7	33km S of Taron, Papua New Guinea
9/2/13 19:14	36.505	-91.655	2.5	9.4	10km WSW of Thayer, Missouri
9/2/13 16:41	38.788	-122.764	2.5	2.2	1km NNW of The Geysers, California
9/2/13 16:12	36.480	71.406	4.6	112.1	25km SSW of Ashkasham, Afghanistan
9/2/13 15:54	51.309	-175.203	4.7	35.0	119km ESE of Adak, Alaska
9/2/13 15:01	-20.182	-69.250	4.7	97.6	93km E of Iquique, Chile
9/2/13 14:56	59.567	-153.404	2.9	106.3	87km ESE of Old Iliamna, Alaska
9/2/13 14:52	28.295	99.299	4.6	35.6	9km NW of Benzilan, China

Problem #3

(CBS News) VIENNA - A man turning dirt in his back yard stumbled onto buried treasure — hundreds of pieces of ancient jewelry and other precious objects in what authorities described Friday as a fairy-tale find. Austria's Federal Office for Memorials said the trove consists of more than 200 rings, brooches, ornate belt buckles, gold-plated silver plates and other pieces or fragments, many encrusted with pearls, fossilized coral and other ornaments. It says the objects are about 650 years old and are being evaluated for their provenance and worth.

At this time, Sotheby's London Auction sold only a few of the damaged items. These were sold at an average price of $2600 with a standard deviation of $100. What are the z-scores for the following sale prices: $2650, $2800, $1950, and $2400?

Problem #4

Espn.com— Miguel Cabrera is a professional baseball player for the Detroit Tigers who is currently ranked #1 in batting average. He is also ranked #1 in the ESPN Fantasy Baseball charts.

Miguel Cabrera's current batting average for this season is .358 with a standard deviation of .025. Using Chebyshev's theorem, determine the percentage of Cabrera's batting average that is within the given ranges in a single game.

a) .273 to .443   b) .318 to .398   c) .303 to .413

Problem #5

MODEL YEAR 2013 FUEL ECONOMY LEADERS
Listed below are vehicles with the highest fuel economy in the most
popular classes. Rankings are based on combined city and highway fuel
economy estimates which assume 55% city driving and 45% highway
driving. Note that many vehicle models come in a range of engine sizes
and trim lines, resulting in different fuel economy values. Only
gasoline/diesel/hybrid vehicles are listed in the evaluation. According to
a study done looking at engine size and average gas mileage on the
highway, results were as followed:
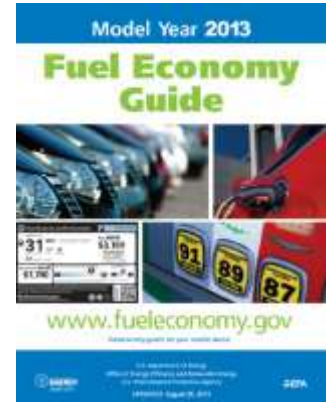
Category	Make	Model	Engine Size (liters)	Cylinders	Highway Mileage (miles/gallon)
Two-Seater Cars	HONDA	CR-Z	1.5	4	37
Minicompact Cars	SCION	iQ	1.3	4	37
Subcompact Cars	CHEVROLET	Spark	1.2	4	34
Compact Cars	TOYOTA	Prius c	1.5	4	50
Midsize Cars	TOYOTA	Prius	1.8	4	50
Large Cars	FORD	C-MAX hybrid FWD	2.0	4	43
Small Station Wagons	AUDI	A3 (diesel)	2.0	4	34
Midsize Station Wagons	TOYOTA	Prius v	1.5	4	50
Small Pickup Trucks	TOYOTA	Tacoma 2WD	2.7	4	23
Standard Pickup Trucks	CHEVROLET	Silverado 15 Hybrid 2WD	6.0	8	21
Vans, Cargo	CHEVROLET	Express 1500 2WD Cargo	4.3	6	17
Vans, Passenger	CHEVROLET	Express 1500 2WD Passenger	5.3	8	14
Minivans	MAZDA	5	2.5	4	24
Small Sport Utility	LEXUS	RX 450h	3.5	6	30
Standard Sport Utility	TOYOTA	Highlander Hybrid 4WD	3.5	6	28

Source: Fuel Economy Guide 2013, US Department of Energy, updated August 20, 2013

Be sure to show all work with proper notation. Do not forget to include the units of measure for
all steps.

a) Find the mean, variance, and standard deviation for the engine sizes.
b) Find the mean, variance, and standard deviation for the highway mileages.
c) Compute the sample covariance.
d) Compute the correlation coefficient.
e) What is the relationship between a vehicles engine size and highway gas mileage? Use
full sentences to describe the relationship. Write the description in such a way that
anyone reading your answer understands the meaning without reading the above problem.

Problem #6

A sample of students was used to determine if college students who go to sleep earlier and tend to get more sleep really do get better grades. Below are the results:

X Hours of Sleep	Y GPA
6.0	3.50
5.0	2.50
4.0	2.40
5.0	2.20
8.0	3.60
7.0	4.00
8.0	3.80
5.0	2.50
5.0	3.00
6.0	3.10
8.2	3.62

Be sure to show all work with proper notation. Do not forget to include the units of measure for all steps.

a)   Find the mean, variance, and standard deviation for the hours of sleep that the college students receive.
b)   Find the mean, variance, and standard deviation for the GPAs of the college students.
c)   Compute the covariance.
d)   Compute and interpret the sample correlation coefficient.

Problem #7

The NFL (National Football League) has 32 teams which are
broken down into eight divisions. Each division has four teams.
Taking a sample of games from the Denver Bronco 2012 football
season, we can study the number of points that Chicago gained
compared to its opponent by looking at the scores of each game.

The following shows the points gained per game by the Denver Broncos during the 2012 season
over their opponents. The data was found by subtracting the points earned by the opponent from
the points that Denver earned. Negative values indicate the Denver Broncos lost the game. **Treat
this as sample data**.
(Round all work to 4 decimal places.)

Number of Points Gained	Number of Games (f_i)
-20 to -11	1
-10 to -1	4
0 to 9	5
10 to 19	4
20 to 29	3
30 to 39	2

a) Create a histogram of the data.
b) Find and interpret the mean of the points gained.
c) Compute the variance of the number of points gained.
d) Compute the standard deviation of the number of points gained.