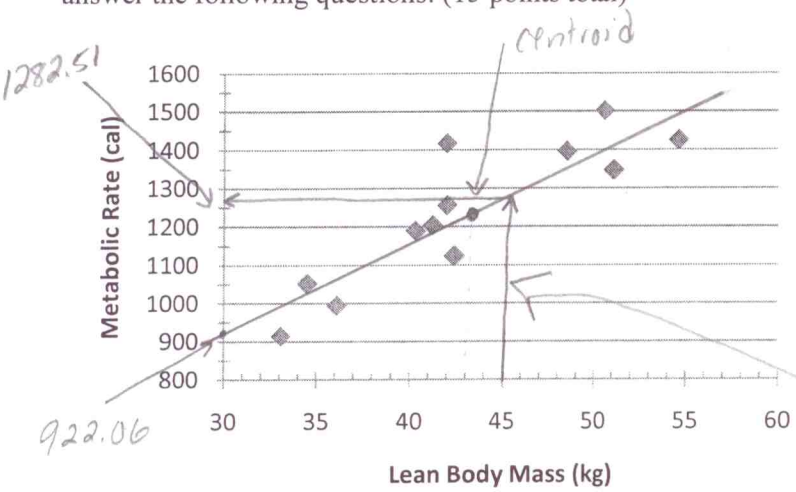
Pledge:

9/25/2009 MATH 171 Name: Solution
Dr. Lunsford Quiz 2 30 Points Possible

Please show all work including calculator input.

I. Metabolic rate, the rate at which the body consumes energy, is important in studies of weight gain, dieting, and exercise. We have data on the lean body mass and resting metabolic rate for 12 women who are subjects in a study of dieting. Lean body mass, given in kilograms, is a person's weight leaving out all fat. Metabolic rate is measured in calories burned per 24 hours, the same calories used to describe the energy content of foods. Below you are given the raw data as well as a scatterplot of the data. Please answer the following questions: (15 points total)



Lean Body Mass (kg)	Metabolic Rate (cal)
36.1	995
54.6	1425
48.5	1396
42	1418
50.6	1502
42	1256
40.3	1189
33.1	913
42.4	1124
34.5	1052
51.1	1347
41.2	1204

(a) Find the centroid of the data and plot it on the scatterplot. Clearly indicate the point on the graph and give its coordinates below. (2 points) $(\bar{x}, \bar{y}) = (43.03, 1235.08)$

(b) Find the equation of the least squares regression line. Clearly give the equation of the line below. (3 points)

$\hat{y} = 201.16 + 24.03x$

(c) Accurately plot the regression line equation on the scatterplot above. Note that the vertical axis is at $x = 30$. (3 points) $201.16 + 24.03(30) = 922.06$

(d) For each increase of one kilogram in lean body mass, would we expect an increase or decrease in metabolic rate and how much of an increase or decrease would we expect? (2 points)

An increase of 24.03 calories

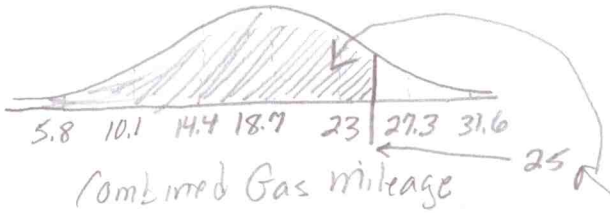
(e) What percent of the variation in metabolic rate is explained by the regression on lean body mass? (2 point) $r^2 = 0.7682$ 76.8%

(f) Use the regression line found in part (b) to predict the expected metabolic rate for a women whose lean body mass is 45 kilograms. Please show all work below and show this prediction graphically on the scatterplot by drawing the "up and over" lines. (3 points)

$\hat{y} = 201.16 + 24.03(45) =$ 1282.51 cal

II. In its Fuel Economy Guide for 2008 model vehicles, the Environmental Protection Agency gives data on 1152 vehicles. There are a number of outliers, mainly vehicles with very poor gas mileage. If we ignore the outliers, however, the combined city and highway gas mileage of the other 1120 or so vehicles can be modeled with an approximately normal distribution with mean 18.7 miles per gallon (mpg) and standard deviation 4.3 mpg. Use this information to answer the following questions. (10 points total)

(a) Draw a graph of the normal distribution for the 1120 vehicles. Be sure to draw the distribution with proper shape, label your axis, and show variable values at ± 1, ± 2, and ± 3 standard deviations from the mean. (4 points)



(b) The 2008 Chevrolet Malibu with a four-cylinder engine has combined gas mileage 25 mpg. What percent of all vehicles have worse gas mileage than the Malibu? Show this percent on the graph you drew in part (a). (3 points)

normalcdf(-1E99, 25, 18.7, 4.3) = 0.9285

92.9%

(c) How high must a 2008 vehicle's gas mileage be in order to fall in the top 10% of all vehicles? (3 points)

invNorm(0.90, 18.7, 4.3) = 24.21 mpg

III. A campus newspaper plans a major article on spring break destinations. The authors intend to call four randomly chosen resorts at each destination to ask about their attitudes toward groups of students as guests. Here are the resorts listed in one city:

01	Aloha Kai	08	Captiva	15	Palm Tree	22	Sea Shell
02	Anchor Down	09	Casa del Mar	16	Radisson	23	Silver Beach
03	Banana Bay	10	Coconuts	17	Ramada	24	Sunset Beach
04	Banyan Tree	11	Diplomat	18	Sandpiper	25	Tradewinds
05	Beach Castle	12	Holiday Inn	19	Sea Castle	26	Tropical Breeze
06	Best Western	13	Lime Tree	20	Sea Club	27	Tropical Shores
07	Cabana	14	Outrigger	21	Sea Grape	28	Veranda

Below is line 130 of the random digits table.

69051 64817 87174 09517 84534 06489 87201 97245

Starting at line 130 obtain the random sample of four resorts (with no repeats). Clearly indicate which resorts are in your sample. (5 points total)

05, 16, 17, 20

Beach Castle, Radisson, Ramada, Sea Club