

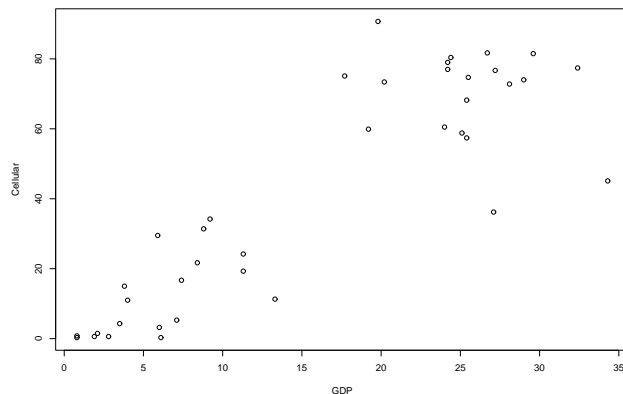
HOMEWORK 9

STAT 201-502

Lecture 18 & 19 Material

	Country	Internet	GDP	CO2	Cellular	Fertility
[1,]	"Algeria"	"0.6"	"6.1"	"3"	"0.3"	"2.8"
[2,]	"Argentina"	"10.1"	"11.3"	"3.8"	"19.3"	"1.2"
[3,]	"Australia"	"37.1"	"25.4"	"18.2"	"57.4"	"1.7"
[4,]	"Austria"	"38.7"	"26.7"	"7.6"	"81.7"	"1.3"
[5,]	"Belgium"	"31"	"25.5"	"10.2"	"74.7"	"1.7"
[6,]	"Brazil"	"4.7"	"7.4"	"1.8"	"16.7"	"2.2"
[7,]	"Canada"	"46.7"	"27.1"	"14.4"	"36.2"	"1.5"
[8,]	"Chile"	"20.1"	"9.2"	"4.2"	"34.2"	"2.4"
[9,]	"China"	"2.6"	"4"	"2.3"	"11"	"1.8"
[10,]	"Denmark"	"43"	"29"	"9.3"	"74"	"1.8"
[11,]	"Egypt"	"0.9"	"3.5"	"2"	"4.3"	"3.3"
[12,]	"Finland"	"43"	"24.4"	"11.3"	"80.4"	"1.7"
[13,]	"France"	"26.4"	"24"	"6.1"	"60.5"	"1.9"
[14,]	"Germany"	"37.4"	"25.4"	"9.7"	"68.2"	"1.4"
[15,]	"Greece"	"13.2"	"17.7"	"8.2"	"75.1"	"1.3"
[16,]	"India"	"0.7"	"2.8"	"1.1"	"0.6"	"3"
[17,]	"Iran"	"1.6"	"6"	"4.8"	"3.2"	"2.3"
[18,]	"Ireland"	"23.3"	"32.4"	"10.8"	"77.4"	"1.9"
[19,]	"Israel"	"27.7"	"19.8"	"10"	"90.7"	"2.7"
[20,]	"Japan"	"38.4"	"25.1"	"9.1"	"58.8"	"1.3"
[21,]	"Malaysia"	"27.3"	"8.8"	"5.4"	"31.4"	"2.9"
[22,]	"Mexico"	"3.6"	"8.4"	"3.9"	"21.7"	"2.5"
[23,]	"Netherlands"	"49"	"27.2"	"8.5"	"76.7"	"1.7"
[24,]	"New Zealand"	"46.1"	"19.2"	"8.1"	"59.9"	"2"
[25,]	"Nigeria"	"0.1"	"0.8"	"0.3"	"0.3"	"5.4"
[26,]	"Norway"	"46.4"	"29.6"	"8.7"	"81.5"	"1.8"
[27,]	"Pakistan"	"0.3"	"1.9"	"0.7"	"0.6"	"5.1"
[28,]	"Philippines"	"2.6"	"3.8"	"1"	"15"	"3.2"
[29,]	"Russia"	"2.9"	"7.1"	"9.8"	"5.3"	"1.1"
[30,]	"Saudi Arabia"	"1.3"	"13.3"	"11.7"	"11.3"	"4.5"
[31,]	"South Africa"	"6.5"	"11.3"	"7.9"	"24.2"	"2.6"
[32,]	"Spain"	"18.3"	"20.2"	"6.8"	"73.4"	"1.2"
[33,]	"Sweden"	"51.6"	"24.2"	"5.3"	"79"	"1.6"
[34,]	"Switzerland"	"30.7"	"28.1"	"5.7"	"72.8"	"1.4"
[35,]	"Turkey"	"6"	"5.9"	"3.1"	"29.5"	"2.4"
[36,]	"United Kingdom"	"33"	"24.2"	"9.2"	"77"	"1.6"
[37,]	"United States"	"50.2"	"34.3"	"19.7"	"45.1"	"2.1"
[38,]	"Vietnam"	"1.2"	"2.1"	"0.6"	"1.5"	"2.3"
[39,]	"Yemen"	"0.1"	"0.8"	"1.1"	"0.8"	"7"

1. Use the data from page 1 on percent of population in a country that uses cell phones called “cellular” to see its association to GDP (in thousands of \$ per capita).



- (a) Describe the scatterplot in terms of (i) form, strength and direction of association and (ii) identifying two nations that have less cell-phone use than you would expect, given their GDP.
- (b) Give the approximate x and y coordinates for the nation that has the (i) highest cell-phone use and (ii) highest GDP.
- (c) Suppose you only considered the correlation for those nations having GDP above 15. Would the correlation be stronger or weaker than for all 39 nations.

2. The correlation between Internet (percentage of adult residents who use the internet) is 0.888 with GDP, 0.818 with cellular-phone use, 0.669 for literacy (percent who are literate), -0.551 for fertility (mean number of children per adult woman), and 0.680 for CO2 (CO2 emissions in metric-tons per capita).
- (a) Which variable has the strongest linear association with Internet?
 - (b) Which variable has the weakest linear association with Internet?
 - (c) Interpret the correlation between Internet use and Fertility.
3. Let y =cell-phone use and x =GDP. The regression equation is $\hat{y} = -0.13 + 2.62x$
- (a) Predict cell-phone use at the (i) maximum x value of 0.8 and (ii) minimum $x = 34.3$
 - (b) Interpret the slope of the prediction equation in terms of the data. Is the association positive or negative?
 - (c) For the US, $x = 34.3$ and $y = 45.1$. Find the predicted cell-phone use and the residual. Interpret this large negative value.

4. Now let's look at the association between x =GDP and y =CO2. $\bar{x} = 16$, $\bar{y} = 6.81$, $\sigma_x = 10.60$, $\sigma_y = 4.67$ and $r = 0.786$.

(a) Find the regression equation for predicted CO2 given a GDP value.

(b) Predict CO2 at the (i) minimum x value of 0.8 and the (ii) maximum $x = 34.3$.

(c) For the US, $x = 34.3$ and $y = 19.7$. Find the predicted CO2 value and the residual. Interpret this large positive

(d) Switzerland is nearly as economically advanced as the US, having $x = 28.1$ and $y = 5.7$. Find the predicted CO2 value and the residual. Interpret.