Assignment: Module 10   Name: Hoyoung kim

Disclaimer: This is my work, not that of others

Total Score: 40

1. 10
2. 10
3. 10
4. 10

1. (10 pt) Use least-squares regression to fit a straight line to the data below.

x 0 2 4 6 9 11 12 15 17 19

y 5 6 7 6 9 8 8 10 12 12

Along with the slope and intercept, compute the coefficient of determination, R^2.

x	y	x*y	x*x						y true	yi-yper	yi-yper^2
0	5	0	0	-9.5	-3.3	90.25	10.89	31.35	4.8881175	0.11188251	0.012517696
2	6	12	4	-7.5	-2.3	56.25	5.29	17.25	5.6064085	0.393591455	0.154914234
4	7	28	16	-5.5	-1.3	30.25	1.69	7.15	6.3246996	0.675300401	0.456030631
6	6	36	36	-3.5	-2.3	12.25	5.29	8.05	7.0429907	-1.042990654	1.087829505
9	9	81	81	-0.5	0.7	0.25	0.49	-0.35	8.1204272	0.879572764	0.773648247
11	8	88	121	1.5	-0.3	2.25	0.09	-0.45	8.8387183	-0.838718291	0.703448372
12	8	96	144	2.5	-0.3	6.25	0.09	-0.75	9.1978638	-1.197863818	1.434877727
15	10	150	225	5.5	1.7	30.25	2.89	9.35	10.2753	-0.275300401	0.075790311
17	12	204	289	7.5	3.7	56.25	13.69	27.75	10.993591	1.006408545	1.012858159
19	12	228	361	9.5	3.7	90.25	13.69	35.15	11.711883	0.28811749	0.083011688
95	83	923	1277				374.5	54.1	134.5	SSe	5.794926569
9.5	8.3							SSt			
10	95		a0	0.359145527	slope						
95	1277		a1	4.88811749	y-int						
y= 4.888+0.359x			R2	0.892884906							

Per spread sheet, slope is 0.359, y intercept is 4.888 and regression is 0.892

2. (10 pt) On average the surface area, A, of a human is related to weight, W, and height, H. Measurements for several individuals of height 180 cm and different weights (kg), give values of area (m^2) in the following table.

W (kg) 70 75 77 80 82 84 87 90

A (m^2) 2.10 2.12 2.15 2.20 2.22 2.23 2.26 2.30

Show that a power law, $A = aW^b$, fits these data reasonably well. Present plots of data along with the model line. Predict what the surface area is for a 95-kg person.

Using python I was able to find the log of all the values then using polyfit I was able to fine the linearized model. Then using power law, I was able to find that the person with 95 kg would have surface area of about 2.34040807038505252m^2

3. (10 pt) Fit an exponential model to
x 0.4 0.8 1.2 1.6 2 2.3
y 800 985 1490 1950 2850 3600

Using python I was able to find the log of both values, then using vstack and Transpose as shown on the slides, I was able to find that exponential model to the given table is $549.815e^{0.8127x}$

4. (10 pt) Find a 3rd order polynomial to fit the following data. Plot the data with your model curve. Tabulate the residual of the predict y-value.
x 3 4 5 7 8 9 11 12
y 1.6 3.6 4.4 3.4 2.2 2.8 3.8 4.6

Using Python polyfit, I was able to find that the regression model is $0.046675x^3 - 1.04120692x^2 + 7.14381722x - 11.48870718 = f(x)$

Using this, I was able to plot