Name: Sonali Preetha Kandagappalan
USN: 1NH18IS109
Section: B
Course Code: 20ISE53
Course Name: Data Science

1.

x Batting Avg.	y Sold Price	$(y_i-\bar{y})$	$(x_i-\bar{x})$	$x_i(y_i-\bar{y})$	$x_i(x_i-\bar{x})$	$\hat{y}_i$	$(x_i-\bar{x})^2$
121.01	350000	-129166.67	9.08	-15630458.74	1098.7708		82.4464
76.32	850000	370833.33	-35.61	28301999.15	-2717.7552		1268.0721
120.71	800000	320833.33	8.78	38727791.26	1059.8338		77.0884
95.45	50000	-429166.67	-16.48	-4096395865	-1573.016		271.5904
72.22	500000	20833.33	-39.71	1504583.093	-2867.8562		1576.8841
165.88	700000	220833.33	53.95	36631832.78	8949.226		2910.6025
114.73	950000	470833.33	2.8	54018707.95	321.244		7.84
127.51	450000	-29166.67	15.58	-3719042.092	1986.6058		242.7364
127.12	200000	-279166.67	15.19	-35487667.09	1930.9528		230.7361
80.64	200000	-279166.67	-31.29	-22512000.21	-2523.2256		979.0641
113.09	400000	-79166.67	1.16	-8952958.71	131.1844		1.3456
128.53	300000	-179166.67	16.6	-23028292.1	2133.598		275.56
1343.21	5750000	2.63		88905371.19	7929.5626		7923.9661

$\bar{x} = 11193$

$\bar{y} = 479166.67$

$(y_i-\bar{y})^2$
$(y_i-\bar{y})(x_i-\bar{x})$
1.6684×10^{10}
1.3751×10^{11}
1.0293×10^{11}
1.8418×10^{11}
434027638.9
4.8767×10^{10}
2.21684×10^{11}
850694638.9
7.7934×10^{10}
7.7934×10^{10}
6267361639
3.210×10^{10}

$\sum(y_i-\bar{y})^2 = 9.071 \times 10^{11}$

$\hat{y}_i$	$(\hat{y}_i-\bar{y})^2$	$\hat{y}_i-\bar{y}$	$y_i-\hat{y}_i$
489347.1	10364046	10180.4	-139347
439241.1	1594078485	-39925.5	410758.9
489010.7	96905944	9844.639	810789.3
460689.5	341406665	-18477.2	-410689
434644.3	1982245103	-44522.4	65355.71
539654.8	3658885218	60488.14	160345.2
482306	98553859.2	3139.329	467694
496634.8	305135323	17468.12	-466348
496167.5	29005017.1	17030.86	-296198
444084.7	1230746773	-35082	-244085
480467.2	1691506	1300.519	-80467.2
497778.4	346396706	18611.74	-19778
	9960936876	59.667	-56.0992

$(y_4 - \hat{y}_i)^2$

19417604577

1.687×10^{11}

96714339416

1.687×10^{11}

42713729 13

25710579593

2.18×10^{11}

21748089 22

87732976401

59577325785

64749978178

39116297768

89731×10^{11}

A) $\hat{B_1} = \frac{\sum_{i=1}^{n} x_i(y_i - \bar{y})}{\sum_{i=1}^{n} x_i(x_i - \bar{x})} = \frac{8890537.181}{7929.5626} = 1121.1889$

$\hat{B_0} = \bar{y} - \hat{B_1}\bar{x}$

$\hat{B_0} = 479166.67 - 1121.1889 \times 111.93 = 353671.9964$

$y_{ii} = \hat{B_0} + \hat{B_1} x_i$

$x_i = 142.8$

$y_{ii} = 353671.9964 + 1121.1889 \times 142.8$

$y_{ii} = 513777.7713$

B) Coefficient of determination $= R^2 = \frac{SSR}{SST} = \frac{(\hat{y}_{ii} - \bar{y})^2}{(y_{ii} - \bar{y})^2} = \frac{9960936876}{9.071 \times 10^{11}} = 0.010981$

C) $SSE = y_{ii} - \hat{y_{ii}} = -560992$

$SST = y_{ii} - \bar{y} = 2.63$

$SSR = \hat{y_{ii}} - \bar{y} = 59.667$

D) $t = \frac{\hat{y_{ii}} - \bar{y}}{\sigma y} = \frac{482306 - 479166.67}{\sigma y} = \frac{3139.33}{274939.3873} = 0.011$ $\quad t < 3$: not smooth.

E) Hypothesis testing

$t = \frac{\hat{B_1}}{se(\hat{B_1})}$

$se = \frac{\sqrt{\sum_{i=1}^{n} (y_i - \hat{y_i})^2 / n-2}}{\sqrt{\sum (x_i - \bar{x})^2}} = \frac{\sqrt{8.9731 \times 10^{11} / 10}}{\sqrt{7923.9661}} = \frac{947264.4826}{89.0166}$

$= 10641.436.$

$t = \frac{1121.1889}{10641.436} = 0.10536$