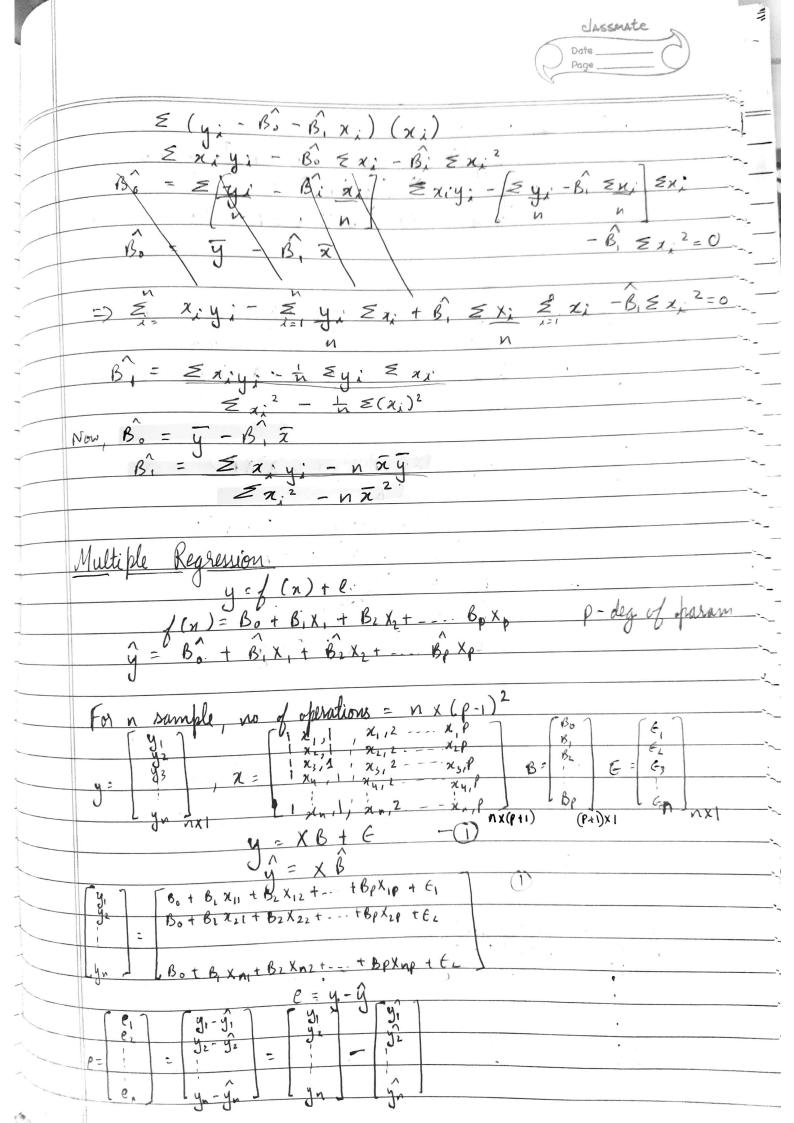
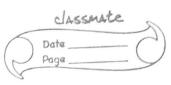


	3
	Regression:
-)	Regression: Predicting House Price, Predicting credit card score, Predict rules would
	Input Var : (Features/independent var / covariate / predutors) Output Var - (Response)
	Output on - (Nesponses
	Fixed ey forms to relate y $2x$ y = f(x) + E error (irreducable) $f(x) = B_0 + B_1 X$
	y = f(x) + E $f(x) = Bx + Bx$
	Linear reg estimate: $\hat{y} = f(\hat{n})$
	Linear reg estimate: $\hat{y} = f(n)$ $\hat{y} = \hat{B}\hat{o} + \hat{B}, X$
Ohi k-	
Jeri vatio	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
	$= (B_{0} - \hat{B}_{0}) + (B_{1} - \hat{B}_{1}) / X + E$
	Residual expers of sample i e: - 4û
	Residual error of sample i ei = y : - ŷ: Sum of squared residual (RSS)
	$RSS = Z_{i} e_{i}$
	η
	Avy min 8, b; = (y, -y,)2
	Avg mi Bo, B; = (y; -B, -B, x;)2 - (1)
	Q Orllerentiato w. n + B.
	2 Eigentiate w.r.t. Bo 2 Eigentiate w.r.t. Bo
	$\geq (y_1 - \beta_0 - \beta_1 x_1) = 0$
	$\hat{\beta}_0 = \hat{z}_1 \left(y_1 - \hat{\beta}_0 - \hat{\beta}_1 \chi_1 \right) = 0$
	$= \underbrace{\mathcal{L}\left(\underbrace{\mathbf{y}}_{1}^{1} - \widehat{\mathbf{b}}_{1}^{1} \underbrace{\mathbf{z}}_{1}^{1}\right)}_{\mathbf{p}}$
	$\hat{\beta_0} = \hat{y} - \hat{\beta_1} \hat{z}$
	Diff Ownt B, 2 = (4: - B) - B(x) (-x:)=0



-	Page
	$RSS = \tilde{z}_1 e^2 \Rightarrow RSS = e^2 e \frac{(nvi)v (nvi)v}{((xn)v(nvi))}$
	$RSC = (u = \hat{x})^T (u = \hat{y}) = (u = x \hat{x})^T (u = y \hat{x})$
•	$RSS = (y-\hat{y})^{T}(y-\hat{y}) = (y-x\hat{B})^{T}(y-x\hat{B})$ $= (y^{T}-\hat{B}^{T}X^{T})(y-x\hat{B})^{T}$ $= y^{T}y-y^{T}X\hat{B}-\hat{B}^{T}X^{T}X\hat{B}$ $= y^{T}y-y^{T}X\hat{B}-\hat{B}^{T}X^{T}X\hat{B}$ $= (y-x\hat{B})^{T}(y-x\hat{B})$
	$\hat{\mathbf{g}}^{T} \mathbf{u} = \mathbf{u}^{T} \mathbf{x} \hat{\mathbf{g}} - \hat{\mathbf{g}}^{T} \mathbf{x}^{T} \mathbf{u} + \hat{\mathbf{g}}^{T} \mathbf{x}^{T} \mathbf{x} \hat{\mathbf{g}}$
	8 4
~	Matrix Diff
-	· y=A = Dy =O ·y=Ax > Dy = A
`	∂x ∂x
	· y = XA -> Dy - AT · y = XTAX -> Dy - 2 XTA
	d a da
	$\frac{S(RSS) = S(y^{T}y - y^{T}x\hat{B} - \hat{B}x^{T}y + \hat{B}^{T}x^{T}x\hat{B}) = 0}{S\hat{B}}$
	S B S B
	$= 6 - y^{T} X - (x^{T} y)^{T} + 2 \hat{B} x^{T} X$
	$= 0 - y^{T}X - y^{T}X + 2\hat{B}x^{T}X$
	$\Rightarrow \frac{28 \times 7}{2} \times = \frac{2}{3} \times \frac{1}{3} \times \frac{1}{$
	$\beta' = y^T x (x^T x)^{-1}$
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
<u>B'</u>	Multiple Reg:
	X, (IO) X2 (Study) Y (Score)
	110 . 40 . 100
F 2	40
	90 20 70
	10
	$\frac{80}{11 = 10 + 1 \times 1}$
	$\hat{J} = (X^T X)^{-1} X^T U$
	. [110 40]
	X = 100 20 XT = 40 30 20 0 10
	1 90 0



		[5 500 100] C.T.] [101/5 -7/30 1/6]
	χтχ	= 500 51000 10800 (X X) = -7/30 1/360 -1/750 -
		100 10300 3000
	XTY.	$\hat{\mathbf{J}} = (\mathbf{X}^{T}\mathbf{X})^{-1}\mathbf{X}^{T}\mathbf{y}$
		0 90
	[]-	-7/30 1/360 -1/450 110 120 100 90 80 80 70
	Ju J	1/6 -1/450 1/360] . 40 30 20 0 10] [60]
) Îs	[20]
	-) Ju -	0.5
		D= 20 + 0.5X, + 0.5X2
		. 30 - 20 (0 3 K, Y 0 3 M Z
		AL I II V. Direce Recording world
8:	Use the foll	owing data to fit the linear regression model.
	w.tx	hat XY X
	140	60 8400 19600 3600
	155	62 9610 24025 3844
	1.59	67 10653 25281 4489
	179	70 12530 32041 4900
	192	7) 13632 36864 5041
	200	72 14400 40000 5184
	212	75 15900 44944 5625
	1237	477 85125 222 755 32683
5	123,	y = 1. 1 b, X
	1 =	(= V(= 1) - (5x) (\(\) (\(\) \)
	200	$(5^{2}) - (2\lambda)$
		477 × 22275 - 123/ X03/23 = 10/3/0 = 52/10
1	4**	$7x 222755 - 1237^2$ 29116
	A	$n\left(\leq xy\right) - \leq x \leq y$
The state of the s	١ , ك	$n\left(\frac{2}{x^2}\right) - \left(\frac{2}{x^2}\right)^2$
		$7 \times (85125) - 1237 \times 477 - 0.200$
The state of the state of the		(x (x(1/2)/ 12/1/11/11/11/11/11/11/11/11/11/11/11/11
Simmango estrucción comunica en afr		$7 \times 222755 - 237^{2}$
	. ^	32.78 + 0.2001 X.

B. 2(year) 2005 2006 2007 2008 2009 29 37 . 45 The sales of a compy (in million dollars) for each year.

Find the least sq. regression line y = au + b

Use the least " as a model to estimate the sales of the compy in 2012 For simplification ne can take years out= x-2005 try tx2. \Diamond 19 58 29 3.7 111 S X 30 -45 180 5 lo=1(Ey-bo En) 1 x(142 - 8.4x10) = 11.6 y : bt an y=8.4+11.6x t = 2012-2005-7 8.4 67 + 11.6 Estimate the line fot for multiple regression. 60 22 155 25 159 6 7 24 179 70 20 192 71 15 b. : y-b, x, -b, x, 72 200 212 75 14 215 78