## stats Cheat Sheet

### by zippyraiden via cheatography.com/106864/cs/21439/

Old Exam	Old Exam 3
<ol> <li>The data used in creating the attached one page of regression analysis printoot come from a study of a nitrid evid procession a single warp barne attacher. The process variables studied were x<sub>1</sub> = power applied to the cathode (W) x<sub>2</sub> = powers in the reaction chamber (mTorr) x<sub>3</sub> = app between the anales and the cathode (cm) x<sub>4</sub> = for of the reacting as Cip<sub>4</sub> =</li> </ol>	2. Consider a discrete random variable $X$ with the following probability function. $\frac{x}{T(y)} \begin{bmatrix} -5 & -3 & -1 & 1 & 3 & 5 \\ -3 & -3 & -3 & -3 & -1 \end{bmatrix}$
$x_4 = \text{now of the reactant gas } \cup_2 r_6$ and the response variable was	(a) Find the cumulative probability function, F(x), for X.
y = selectivity of the process (SiN/polysilicon).	5 0 25-5
Note that the "StdErr Pred y" column on the output is for the second regression analysis.	T(1) - (1) -5< 2<-3
Use the first regression analysis output in answering the questions (s)—(d) below. Note that $\overline{x}_3 = 0.0000$	$\left  \begin{array}{c} 2 \\ 5 \end{array} \right  $
0.9638 and $\sum (x_{34} - x_3)^2 = 0.3055$ . (a) What fraction of observed raw variation in y is explained by a linear equation in $x_3$ ? [2] $R^2 = 0.799$	$F(x) = \begin{cases} -1 & -5 \cdot 2 \cdot x - 3 \\ -2 & -3 \cdot 2 \cdot x - 1 \\ -3 & -1 \cdot 3 \cdot x - 1 \\ -9 & -1 \cdot 3 \cdot x - 3 \\ -9 & -3 \cdot 2 \cdot x - 5 \\ -9 & -3 \cdot 2 \cdot x - 5 \\ -7 & -7 & -3 \cdot 2 \cdot x - 5 \\ -7 & -7 & -7 & -7 \\ -7 & -7 & -7 & -7$
(b) What is the sample correlation between y and $x_3$ ? <sup>[2]</sup> $-\sqrt{R^2} = -a_1 R^{24}$ (same sign as that of $b_3$ )	(b) Compute the mean and standard deviation of X.
(c) Give a 95% upper confidence bound for the increase in mean value of selectivity of the process for a 0.2 cm increase in gap between the anode and the cathode. (No need to simplify.)	$E X = \sum x f(x) = (-5)(.1) + (-3)(.1) + (-1)(.3) + (-1$
$ \begin{array}{c} \left[ 8 \right] \\ c_{1} \geq \left( \frac{b_{1}}{b_{1}} + \frac{c_{1}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ = 0, 2 \left( -1, 0.96 + 1.433 \frac{a.0787}{\sqrt{A^{3} e_{2} c_{2}}} \right) \\ c_{1} \left( \frac{b_{1}}{\sqrt{Z(c_{2},\overline{z})}} + \frac{c_{1}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2} \left( \frac{b_{1}}{b_{1}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2} \left( \frac{b_{2}}{b_{1}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{1} \left( \frac{b_{1}}{b_{1}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2} \left( \frac{b_{2}}{b_{1}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2} \left( \frac{b_{2}}{b_{2}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2} \left( \frac{b_{2}}{b_{1}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2} \left( \frac{b_{2}}{b_{2}} + \frac{c_{2}}{\sqrt{Z(c_{2},\overline{z})}} \right) \\ c_{2$	$\int_{4x} \chi = E (\chi - E\chi)^2 = \sum (z - E\chi)^2 f(x) = (-s)^2 (-(1) + (-3)^2 (-1))$
Q(1.95) of to is 1.833	$V_{AY}X = E(X - EX)^{c} = \geq (z - EX)f(z) - (-s)^{c}(z)^{c}$
(d) Give a 95% two-sided prediction interval for the next selectivity of the process when gap between	$+ (-1)^2 (.3) + 1^2 (.3) + 3^2 (.1) + 5^2 (.1) = 7.4$
the anode and the cathode equals 1.1 cm. (No need to simplify.)	$\sqrt{V_{arX}} = \sqrt{7.4} = 2.72$
$\begin{array}{l} [4] \\ \hat{y} \pm t \cdot S_{LT} : \sqrt{j + \frac{1}{n} + \frac{(z - 5)^2}{\sum (a_1 - 3)^2}} & Q_1(92) \not= fy^{-12} \\ 2 \cdot 2 \cdot 4z \\ 2 \cdot 524 - j_1 \cdot 0 \neq \delta(J_1) \pm 2 \cdot 2 \cdot 2 \cdot 0 \cdot 09 \cdot 67 \cdot \sqrt{j + \frac{1}{n} + \frac{(J_1 - 5)^2 + 2}{43255}} \end{array}$	
2,524-1,046 (1.1) ± 2,262 · 0,0967 /1+11 + (1.1-2968) 9,3055	
	Old Exam 4
Old Exam 2	
	(i) Find the value of an F statistic and its degrees of freedom for testing whether all the predicto x <sub>1</sub> , x <sub>2</sub> , x <sub>3</sub> , and x <sub>4</sub> can be dropped from this MLR model. What is your conclusion?
The following questions $(e)$ —(j) are based on the multiple linear regression (MLR) model	[4]
The following questions (e)—(j) are based on the multiple linear regression (MLK) model $y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \epsilon_i.$	Observed $F = 40, \geq 1$ df = 4.6
Use the attached printout in answering these questions.	
(e) What is the sample correlation between $y$ and $\tilde{y}$ ?	Conclusion (circle only one):
(e) What is the sample correlation between y and y? $\int \overline{\mathcal{R}^2} = \int \overline{\mathcal{A} \mathcal{G} \mathcal{G} \mathcal{G}} = \mathcal{A} \mathcal{B} \mathcal{B} \mathcal{Z}.$	(a) all the predictors should be dropped (b) not all the predictors should be dropped
<ul> <li>(f) Give the fitted values and residual corresponding to the third observation (with x<sub>1</sub> = 275, x<sub>2</sub> = 550, x<sub>2</sub> = 1.2, x<sub>4</sub> = 200 and y = 1.10). (No need to simplify.)</li> <li>(f) ⊆ b<sub>2</sub> → b<sub>2</sub> → x<sub>2</sub> → b<sub>2</sub> → b</li></ul>	2
$\begin{array}{l} \text{(d)} & \int_{-\infty}^{\infty} z_{1} = (z_{1}, z_{1} \in \mathcal{Q} \text{ data} y = (z_{1}), (z_{1} \in \mathcal{Q} \text{ data} y = (z_{1}), (z_{1}), (z_{1} \in \mathcal{Q} \text{ data} y = (z_{1}), (z_{1}$	
$\mathcal{L} = y - \hat{y} = 1.10 - \hat{y}$	
(g) Give a 95% two-sided prediction interval for the next selectivity of the process corresponding to the conditions of the third observation. (No need to simplify.)	(j) Find the value of an F statistic and its degrees of freedom for testing whether the predicto x <sub>1</sub> , x <sub>2</sub> , and x <sub>4</sub> can be dropped from this MLR model. What is your conclusion?
[4] $\hat{y} \pm t \cdot \sqrt{s_{F}^{2} + (s_{F} \cdot A)^{2}}$ $Q(.925) \text{ of } t_{e} \text{ is } 2.447$	$\frac{16}{1} = \frac{(SSR - SSR_1)/p}{SSE_{F}/(n+4-1)} = \frac{(a, 1622 - a, 3341)/3}{a, 0.1524/(n-4-1)} = 9,19$
ŷ ± 2,447 , /(aaso))² + (a,0423)²	$SSE_{f}/(n-k-1) = a.01509/(n-k-1) = 1.17$
() is given in part (f) above)	Observed $E = 2.12$ df = $\sqrt{2}$

# testing whether the predictors our conclusion? 3+1)/<del>3</del> 1-4-1) = 9.19

Observed F = 9.19 df = <u>3</u>, <u>6</u> Conclusion (circle only one):

(a)  $x_1, x_2$ , and  $x_4$  should be dropped (b) at least one of  $x_1, x_2$ , and  $x_4$  should not be dropped

Not published yet. Last updated 19th December, 2019. Page 1 of 1.

#### Old Exam 5

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The following questions (e)-(j) are based on the multiple linear regression (MLR) model
                                                                                                                                                                                                          y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \epsilon_i.
    Use the attached printout in answering these questions.
        (e) What is the sample correlation between y and \tilde{y}^{2}
[2] \qquad \sqrt{R^{2}} = \sqrt{a.964} = a.982.
    (f) Give the fitted was and readinal corresponding to the third observation (with x_1 = 275, x_2 = 550, x_3 = 1.2, x_4 = 200 and y = 1.10. (No root to simplify.)

(f) \hat{f} = \int_{0}^{0} - \int_{0}^{1} \cdot \mathcal{F}_{0} + \int_{0}^{1} \cdot \mathcal{
                                                                           \mathcal{C} = \mathbf{y} - \hat{\mathbf{y}} = 1.10 - \hat{\mathbf{y}}

    (c) Give a 95% two-olded prediction interval for the next selectivity of the process corresponding to the conditions of the third observation. (No need to simplify)
    (d) $\overline{\sigma} ± t_{-1} \sqrt{\sigma} + (\overline{\sigma}_{27} + \overline{\sqrt{\sigma}_{27}} + \overline{\sqrt{\sqrt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\strt{\st}}}}}}}}}}} \s \s \s \s \s \str}}}}}}}}} \s \s \s \s \s \s \
                                                      ( is given in part (F) above)

    (h) Give a 95% lower confidence bound for β<sub>3</sub>. (No need to simplify.)
    [4] 1 - 4 40 - 400

                                                                           b3 - t. (Sof Nog) Q(1.95) of to is 1.943
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-1.041-(1.94<u>3</u>)·(0.0953)

### Old Exam 6

ting whether all the predictors s your conclusion?

The data used in creating the attached one page of regression analysis printont come from a study of a triffed exch process on a single "safe plasma stude. The process variables studied were $x_1 = prosesser in the reaction chamber (mTorr)$ $x_2 = prosesser in the reaction chamber (mTorr)x_3 = qap between the anode scat the cathode (m)x_4 = qap of the reaction gap of the cathode (m)x_4 = qap of the reaction gap of x_4 = q_4and the response writible wasy = selectivity of the process (SN/polynilicon).$
Note that the "StdErr Pred y" column on the output is for the second regression analysis.
Use the first regression analysis output in answering the questions (a)—(d) below. Note that $\mathbb{Z}_3=0.9636$ and $\sum(x_{34}-\mathbb{Z}_3)^2=0.3055.$
(a) What fraction of observed raw variation in y is explained by a linear equation in $x_3$ ? [2] $R^2 = a,799$
(b) What is the sample correlation between y and $x_3$ ? [2] $-\sqrt{R^2} = -\alpha S94$ (same sign as that of $b_3$ )
(c) Give a 90% upper confidence bound for the increase in mean value of selectivity of the process for a 0.2 cm increase in gap between the anoise and the cathode. (No need to simplify) $\begin{bmatrix} [3] \\ \ell_{1} \leq \ell_{1} \leq \ell_{2} + \frac{\ell_{1}}{\sqrt{2\zeta_{2}^{2} \zeta_{2}^{2} \zeta_{2}^{2}}} \end{bmatrix} = d_{1} \geq (-\ell_{1} \circ \mathcal{G}\mathcal{G} + \ell_{1} \partial \mathcal{G} ) = \frac{d_{1} \partial \mathcal{G}}{d (\overline{d} \partial \partial \mathcal{G} )}$ $\begin{array}{c} \mathcal{Q}(\ell_{2} \mathcal{G}) \\ \mathcal{Q}(\ell_{2} \mathcal{G}) \\ \mathcal{G}(\ell_{2} \mathcal{G})$
(d) Give a 56% two-sided production interval for the next selectivity of the process when gap between the anode and the calculation interval for the next to simplify.) [4] $\hat{\mathcal{G}} \pm \hat{\mathcal{I}} \cdot \mathcal{J}_{\Delta,\overline{\mathcal{F}}} \cdot \sqrt{f + \frac{f}{f_{T}} + \frac{\langle \mathcal{L} < \mathcal{D} \rangle}{\mathcal{L}}} \cdot \frac{\mathcal{Q}_{1}(s,\mathcal{P}S)}{s,c_{2}c_{2}}}  \mathcal{Q}_{1}(s,\mathcal{P}S) \neq \frac{f}{s'} \cdot \frac{s'}{s'}}{s,c_{2}c_{2}}$
2,524 -1,046 (1.1) ± 2,262 . 0,0967 /1+1/ + (1.1-a96)65

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(h) Give a 95% lower confidence bound for  $\beta_3$ . (No need to simplify.)

-1.041-(1.943)·(0.0953)

b3 - t. (Sof. Nog) Q (.95) of to is 1.943

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