Spring 2020	Stat 305 (Section 4)	Quiz 2
Name:		
- v	Points for individual questions are given calculations clearly. Put final answer	
1.	[6+6+6+2+	+4+4+2=30 points]
Control and Industrial Statistics data were collected in a study of were fired at an angle of $40^{\circ}$ aga hardnessnumber $x_2$ , and the result	ttached JMP output (Page 5) appear by Duncan (and were from a paper of the effectiveness of armor plate. Arrainst armor plate of thickness $x_1$ (in 10 alting so-called ballistic limit, $y$ (in ft/square equations fit to the data?	f L. E. Simon). The mor-piercing bullets $0^{-3}$ in.) and Brinell
Equation 2: $\hat{y} =$		
	variability in the ballistic limit is accou	nted for by the two
	For equation 1	:
	For equation 2	:
(c) What is the sample correl number.)	lation between $y$ and $\hat{y}$ by the two e	equations? (Give a

(d) What is the sample correlation between  $ballistic\ limit\ (y)$  and  $thinkness\ of\ the\ armor$ 

plate  $(x_1)$ ? (Give a number, be careful about the sign.)

For equation 1:

For equation 2:

(e)	Using the first equation, what	$ballistic\ limit$	would you predict w	hen thinkness of
	the armor plate is $251 \times 10^{-3}$ in.	? Would you	be willing to predict	strength of wood
	$beams$ when $moisture\ content$ is	$100 \times 10^{-3} \text{ in.}$	? Why or why not?	

Yes/No? Why:

(f) Using the **second equation**, find the values of the <u>residuals</u> for the first 2 data points (the first two data points are the two observations in the the first row of the data table).

residual for first data point =

residual for second data point =

(g) Using the **second equation**, about what **change** in average *ballistic limit* seems to accompany a 2-unit increase in both  $x_1$  and  $x_2$ ? (For  $x_1$ , one unit is  $10^{-3}$  in.)

change in 
$$y =$$

2. [4+4+6=14 points]

Consider a discrete random variable X with the probability mass function as specified below. The constant c is to be determined.

	x	-2	-1	0	1	2
Γ.	$\overline{f(x)}$	0.1	0.2	c	0.2	0.3

(a) Determine c and make a probability histogram (barplot) for X.

c =

(b)	Find	P( X	< 2)	and	P( X	-1	>	1)	
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$$P(|X| < 2) =$$

$$P(|X-1| > 1) =$$

(c) Find the mean and standard deviation of X.

 $\mu =$ 

 $\sigma =$ 

**3.** [6 points]

Suppose that 15% of all daily oxygen purities delivered by an air-products supplier are below 99.5% purity and that it is plausible to think of daily purities as independent random variables. Evaluate the probability that in the next five-day workweek, 1 or less delivered purities will fall below 99.5%.

probability =

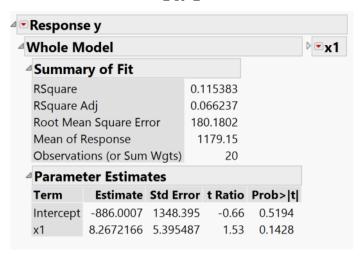
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## **Data Table**

$x_1$	$x_2$	у	$x_1$	$x_2$	у
253	317	927	253	407	1393
258	321	978	252	426	1401
259	341	1028	246	432	1436
247	350	906	250	469	1327
256	352	1159	242	257	950
246	363	1055	243	302	998
257	365	1335	239	331	1144
262	375	1392	242	355	1080
255	373	1362	244	385	1276
258	391	1374	234	426	1062

## JMP Output

Fit 1



Fit 2

