

Directions: Place your answers on the templates provided. Show your work.

1. A doctor knows that muscle mass decreases with age. To help him understand this relationship in women, the doctor selected women beginning with age 40 and ending with age 80. The data is given in the table below.

x is age, y is a measure of muscle mass (the higher the measure, the more muscle mass).

- Use your calculator to make a scatter plot that shows how age helps explain muscle mass. Does there appear to be a linear relationship? Find the Pearson sample correlation coefficient, r . What does r tell you about the strength of the relationship?
- At the 1% level of significance, perform a hypothesis test to test the significance of the correlation coefficient. Use your scatter plot's shape to determine the form of the alternative hypothesis.
- Find the least squares regression equation. Interpret slope and y-intercept in context of the problem. Be sure to graph this regression equation within your scatter plot to make sure your equations appears to "best fit" the data.
- Predict the muscle mass for women aged 60 years.
- Is the predicted value in part d. an interpolated or extrapolated value? Explain.
- If the muscle mass of a woman was determined to be 58, what age does the model predict she would be?
- Would you trust the model's prediction for the value you calculated in part f? Why or why not?
- In order to help you have more "good faith" in your model, create a residual plot. You must plot the original x -values(AGE) along with the residuals as Y -values(Residual = $y - y'$). Are there any patterns in the residual plot that would make you "second guess" your original assumption of linearity?

x (Age)	y (Muscle Mass)		x (Age)	y (Muscle Mass)
72	80		77	63
62	92		63	86
42	101		46	105
66	69		57	73
55	86		44	95
71	73		51	100
67	79		40	112
57	83		80	75

2. A random sample of Senators and Representatives in Washington, D.C., gave the following information about party affiliation and number of dollars spent on federal projects in their home districts.

**Dollars Spent on Federal Projects
In Home Districts**

Party	Less than 5 Billion	5 to 10 Billion	More than 10 Billion	RT
Democratic	8	15	22	45
Republican	12	19	16	47
CT	20	34	38	92

Using a 1% level of significance, test the claim that federal spending in home districts is independent of party affiliation.

3. A gambler at the Mohegan Sun complained about the outcomes on the dice at the tables, because he claims that they seem loaded! The dice were taken off the table and tested one at a time. Once die was rolled 300 times and the following frequencies were recorded:

Outcome	1	2	3	4	5	6
Observed Frequency	62	45	63	32	47	51

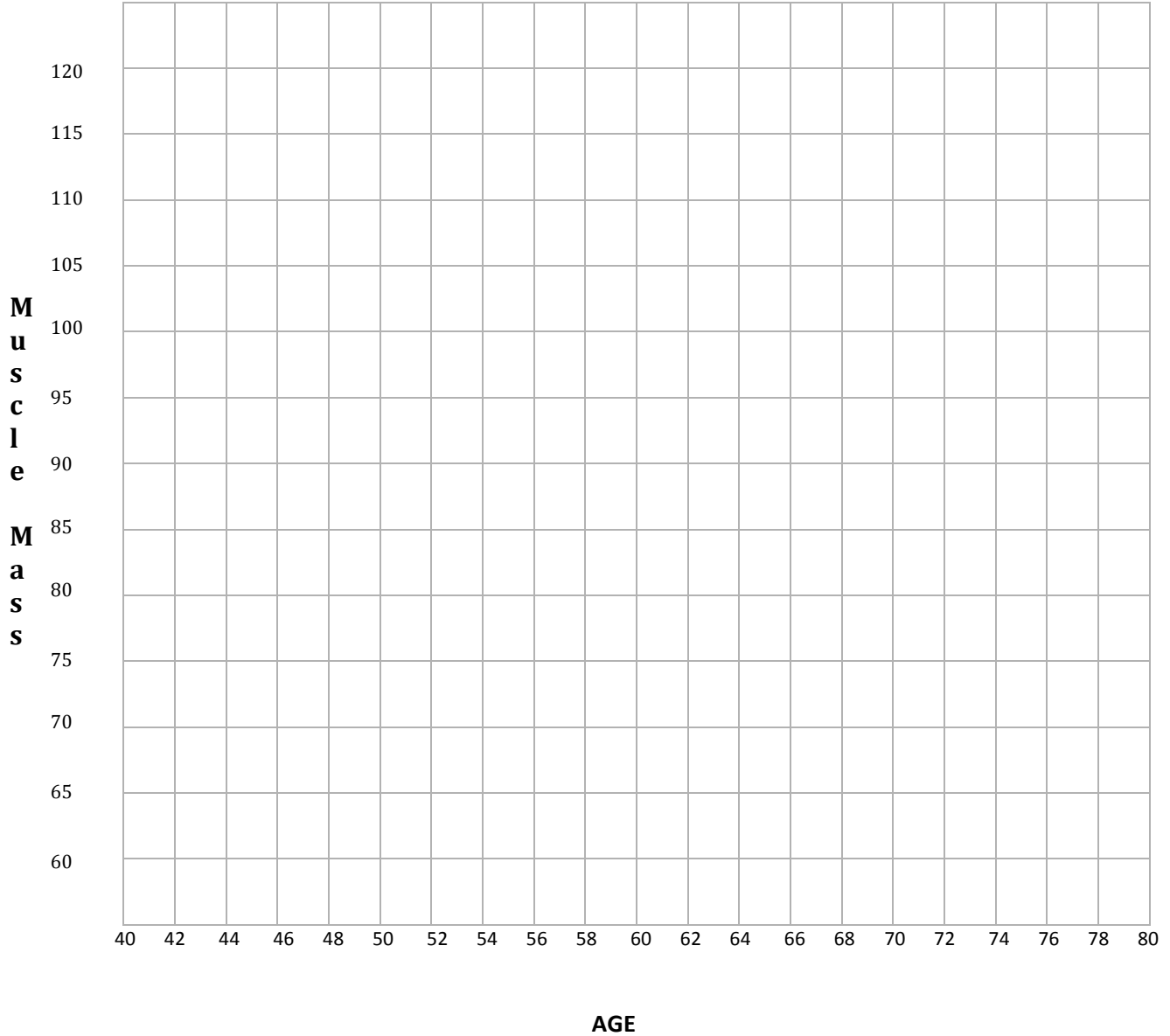
Using a 1% level of significance, do these data indicate that the die is loaded? Test against the uniform distribution.

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Answer Pages

1. a.

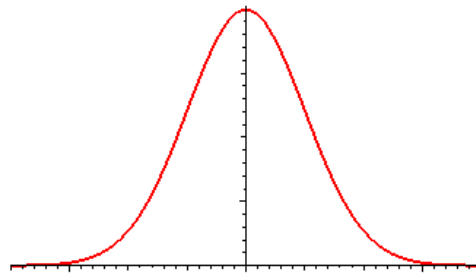


1. cont...

b. Hypothesis Test:

$$H_0: \rho = 0$$

$$H_a: \rho \neq 0$$



$$\alpha = \underline{\hspace{2cm}}$$

$$\text{Testing Statistic: } t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} =$$

$$\text{df} = n - 2 = \underline{\hspace{2cm}}$$

$$\text{Critical Value: } t_c = \frac{\hspace{2cm}}{\text{(from Table III)}}$$

$$r = \underline{\hspace{2cm}}$$

$$\text{p-value: } \underline{\hspace{2cm}}$$

$$\text{Result of Test: } \underline{\hspace{2cm}}$$

Conclusion: Based on the given information... _____

c.

d.

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1. cont...

e.

f.

g.

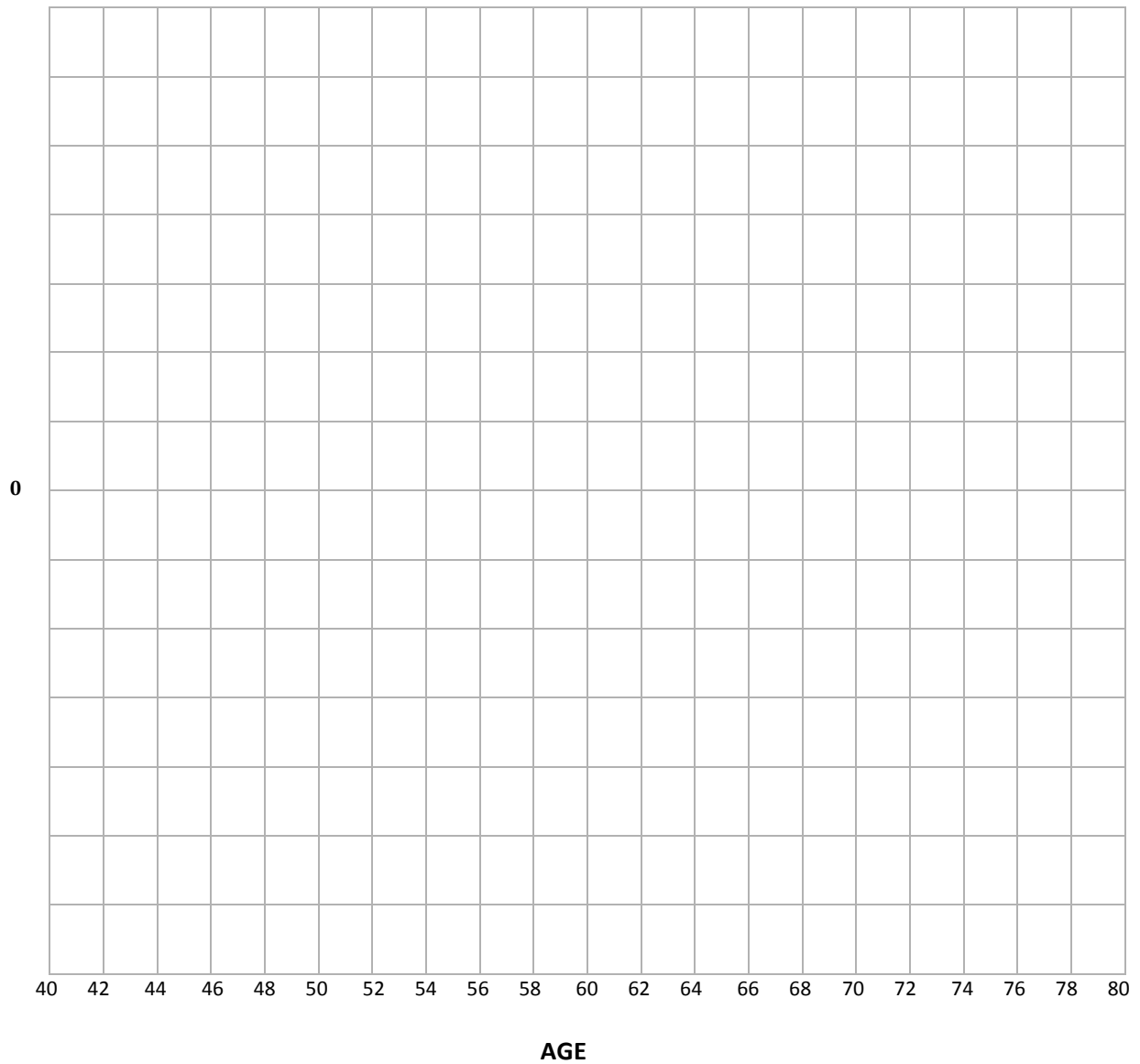
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1. cont...

h.

RESIDUAL



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2.

Null Hypothesis: H_o : _____

Alt.Hypothesis: H_a : _____

Contingency Table

Calculate the Chi-Square Testing Statistic

Observed Frequency O	Expected Frequency E	(O - E)	(O - E) ²	$\frac{(O - E)^2}{E}$

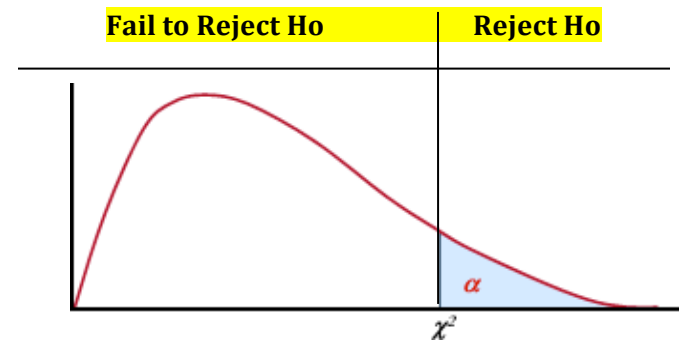
Chi-Square Test Statistic:

$$X^2 = \sum_{all\ cells} \frac{(O - E)^2}{E} =$$

p-value: _____
(from Minitab or TI Calc)

df = (r - 1) · (c - 1) = _____

χ^2_c : _____
(from Table IV)



Result of test : _____

Final Conclusion: Based on the given information...

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3.

Null Hypothesis: H_o : The sample data fits the _____ distribution.

Alt.Hypothesis: H_a : The sample data does not fit the _____ distribution.

Contingency Table

Calculate the Chi-Square Testing Statistic

Observed Frequency O	Expected Frequency E	(O - E)	(O - E) ²	$\frac{(O - E)^2}{E}$

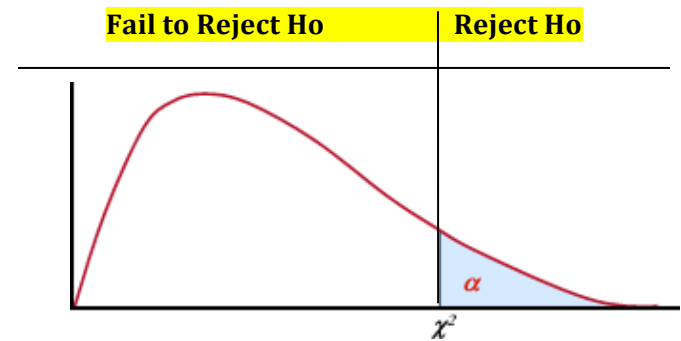
Chi-Square Test Statistic:

$$X^2 = \sum_{all\ cells} \frac{(O - E)^2}{E} =$$

p-value: _____
(from Minitab or TI Calc)

df = k - 1 = _____

χ^2_c : _____
(from Table IV)



Result of test : _____

Final Conclusion: Based on the given information...
