DIRECTIONS: Choose Option One or Option Two.
Save two electronic copies of your answer (one with just your ID number assigned to you, the other with your ID number and name). Email both copies to Cybele Hinson <ch56@txstate.edu>; print out and turn in a hard copy as well with both your id number and name written on it.

Option 1:
Background and Motivation
Opportunities for crime are central to environmental criminology (Felson & Clarke, 1998). This exam focuses on the relationship between delinquency and opportunities for crime. The hypothesis is that opportunities for crime have a positive effect on delinquency. That is, opportunities for crime are criminogenic. However, the effect of opportunities for crime on delinquency depends on gender. The measure for gender for this exam ignores the complexity surrounding the disagreement between sex and gender.

Estimate an ordinary least squares multiple regression model to test the following hypothesis:

Opportunities for crime have a positive effect on delinquency but this effect is larger for males (smaller for females).

Hold constant the potentially confounding effects of: (1) importance of high career aspirations; (2) importance of religious activities; (3) importance of obtaining a college-level education; and (4) whether the respondent's race is white.

You may use a calculator.
You will be assessed based on your responses to the following items:

1. Using the data file described below, use SPSS to estimate a multivariate ordinary least squares regression equation with criminal offending as the dependent variable. The primary independent variables are gender, opportunities for crime, and the statistical interaction (i.e., the product term) of gender and opportunities for crime. The secondary variables (that is, the control variables) are: career importance, religiosity, importance of education, and race.

2. Interpret the model-fit statistics associated with the model you estimated.

3. Based on the model you estimated, interpret (a) the y-intercept; (b) the slopes (i.e., the coefficients) for the primary independent variables; (c) the slope for the career
importance variable; and (d) their tests of statistical significance. Assume that all continuous variables have been mean centered.

4. Examine measures of collinearity and determine whether levels of multicollinearity seem problematic for the model you estimated. If problems exist, however, do not attempt to address problems with additional analysis.

5. What is the effect of opportunities for crime on criminal offending for males?
   A. -21.473
   B. -1.321
   C. 0.148
   D. 1.469

6. What is the effect of opportunities for crime on criminal offending for females?
   A. -21.473
   B. -1.321
   C. 0.148
   D. 1.469

7. Assume that the standard error for the effect of opportunities for crime is the same for both male and females. Report (1) the numeric value of the t statistic for this effect for females; and (2) whether this effect is statistically significant (p < .05).
The data file contains data from 500 individual respondents. The variables relevant to the exam are named and described below.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>crime</td>
<td>A continuous measure for criminal offending. Higher values indicate more offending. Refer to units of this variable as points on the criminal offending scale.</td>
</tr>
</tbody>
</table>
| Female        | A dummy-coded variable for sex of respondent.  
|               | 0 = not female  
|               | 1 = female |
| crimeopp      | A mean-centered and continuous measure of opportunities for crime. Higher values indicate more opportunities for crime. Refer to units on this scale as points on the opportunities for crime scale. |
| product       | The product-term for the statistical interaction between gender and opportunities for crime (that is, product = female \( \times \) crimeopp). |
| Career        | A mean-centered and continuous measure for career importance. Higher values indicate more importance. Refer to units of this variable as points on the career importance scale. |
| Relig         | A mean-centered and continuous measure of religiosity. Higher values indicate more religiosity. Refer to units on this scale as points on the religiosity scale. |
| Collimp       | A mean-centered and continuous measure for importance of obtaining a college-level education. Higher values indicate more importance. Refer to units of this variable as points on the importance of education scale. |
| White         | A dummy-coded variable for respondent race.  
|               | 0 = not white.  
|               | 1 = white |

End of Option 1
Option 2:
Background and Motivation

Opportunities for crime are central to environmental criminology (Felson & Clarke, 1998). “Opportunity makes the thief” is more than just a saying in environmental criminology (Clarke & Eck). This exam focuses on the relationship between delinquency and opportunities for crime. The hypothesis is that opportunities for crime have a positive effect on delinquency. That is, opportunities for crime are criminogenic. However, the effect of opportunities for crime on delinquency depends on gender.

The hypothesis is: Opportunities for crime have a positive effect on delinquency but this effect is larger for males (smaller for females).

The table below presents results for a multivariate regression model using data from 1,490 respondents.

Criminal offending, the dependent variable, is a continuous measure where higher values indicate more offending.

The measure for opportunities for crime is a mean-centered and continuous variable. Higher values indicate more opportunities for crime.

Gender is measured as a dummy-coded variable where a value of 1 indicates that the respondent is female. The measure for gender for this exam simplifies the complexity surrounding the disagreement between sex and gender.

The product-term statistical interaction is based on these measures of opportunities for crime and gender.

You may use a calculator.
You will be assessed based on your responses to the following items:

1. Interpret the estimates and the tests of statistical significance for the effects of (a) female; (b) opportunities for crime; and (c) the product of these two variables. Do the results in the table support the hypothesis?

2. Based on the results:
   (a) What is the effect of opportunities for crime on actual offending among females? Report the actual numeric value.
   (b) What is the effect of opportunities for crime on actual offending among males? Report the actual numeric value.

3. What is the standard error for the effect of religiosity? Report the actual numeric value.
4. Based on the results and while being mindful of the table’s footnotes regarding variable coding, interpret the constant (that is, the y-intercept).

5. The authors reported a variance inflation factor (VIF) for each variable. Explain and discuss (a) collinearity; (b) strengths and weaknesses of using the VIF as a measure of collinearity; and (c) whether collinearity levels are problematically high.

6. The authors concluded that the importance of completing high school is negatively related to criminal offending. As the importance of education increases, offending decreases. The authors also conclude, however, that the importance of having a successful career has a positive effect on criminal offending. As the importance of having a successful career increases, offending increases. Based on the results, what statistical issue is likely responsible for these contradictory findings?

7. Based on the results, interpret the model-fit statistics.
### Table for statistics exam, option 2

Ordinary least squares model explaining criminal offending

\[ N = 1,490 \]

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female(^a)</td>
<td>-6.770</td>
<td>-1.031</td>
<td>1.980</td>
</tr>
<tr>
<td>Opportunities for crime(^b)</td>
<td>1.377(^*)</td>
<td>6.937</td>
<td>1.970</td>
</tr>
<tr>
<td>Opportunities for crime(^b) × Female(^a)</td>
<td>-1.013(^*)</td>
<td>-3.551</td>
<td>2.740</td>
</tr>
<tr>
<td>Attachment to Family(^b)</td>
<td>-0.117</td>
<td>-0.757</td>
<td>1.100</td>
</tr>
<tr>
<td>Religiosity(^b)</td>
<td>-2.633(^*)</td>
<td>-3.764</td>
<td>1.030</td>
</tr>
<tr>
<td>Importance of Completing High School(^b)</td>
<td>-11.007(^*)</td>
<td>-2.664</td>
<td>7.790</td>
</tr>
<tr>
<td>Importance of Having Successful Career(^b)</td>
<td>2.697</td>
<td>0.779</td>
<td>7.870</td>
</tr>
<tr>
<td>Age(^b)</td>
<td>3.752(^*)</td>
<td>3.062</td>
<td>1.050</td>
</tr>
<tr>
<td>White(^a)</td>
<td>1.512</td>
<td>0.256</td>
<td>1.060</td>
</tr>
<tr>
<td>Constant</td>
<td>-31.235</td>
<td>-1.124</td>
<td>--</td>
</tr>
</tbody>
</table>

\[ R^2 = 0.0863 \quad \text{Root MSE} = 89.977 \]

Model-fit Statistics

\[ F_{9,1480} = 16.62, \quad p < .05 \]

\(^* p < .05\)

\(^a\) A dummy-coded variable where zero indicates absence of characteristic.

\(^b\) A continuous variable that is mean centered.

### End of Option 2