Experimental Statistics for Biological Sciences I

Homework #9 – due Tuesday, 01 December 2016

*** turn in only starred * exercises *** (three this time)

Text: 10.18, 10.20, 10.21*(skip c), 10.22*

(checking editions, 10.20, 10.21 (7th) are the same as (6th); 10.18 has different numbers; 10.22 is not in the 6th edition)

1) (extension from quiz) As part of an experiment to control adelgids (small bugs), 10 predators were fed adelgid eggs from one species A. Tsugae and another 10 predators fed on eggs from another species A. Piceae.

Tsugae: mean 30.0, sample variance 230

Piceae: mean 39.3, sample variance 175

Since the Tsugae eggs are only about \( \frac{3}{4} \) the size of the Piceae eggs, construct a 95% confidence interval for the difference in volume: \( 0.75 \mu_{Tsugae} - \mu_{Piceae} \).

*2) A few years ago, I did some research before buying a house. In a neighborhood near my church, I found several houses that have sold in the last few months and compiled the selling prices and the size of the houses, measured in heated square feet. Ignoring other factors (like the hideous purple siding on one house), I propose the simple linear regression model relating the price \( Y_i \) of a house \( i \) (in thousands of dollars) and the heated floor space \( X_i \) (in hundreds of square feet). Below are measurements from 8 houses for sale in the Village Lakes subdivision.

<table>
<thead>
<tr>
<th>House</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price (in $k)</td>
<td>106</td>
<td>123</td>
<td>114</td>
<td>125</td>
<td>131</td>
<td>130</td>
<td>127</td>
<td>144</td>
</tr>
<tr>
<td>H Floor Space (x)</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>15</td>
<td>15</td>
<td>17</td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>

Useful Statistics: \( n=8, S_{xx}=48, S_{yy}=912, S_{xy}=192 \)

a) Plot the data.

b) What are the units of \( \beta_0 \) and \( \beta_1 \)?

c) Find their least squares estimators and standard errors.

d) Find \( s_e^2 \), the estimate of the variance and give its degrees of freedom.