Suggested Answers to Problem Set 3

2. Properties of Polynomial Trends

(a) A polynomial of degree \( p \) can have at most \( p - 1 \) local optima. Here \( p = 6 \), so the answer is 5.

(b) This model encompasses linear and quadratic trend models as special cases. For example, a linear trend model can be obtained by setting \( \beta_2 = \ldots = \beta_6 = 0 \).

(c) No. Trends should be smooth; a polynomial of degree six can wiggle too much.

(d) The in-sample fit looks very good. But we can expect that the out-of-sample forecast will probably reveal wiggles that would not ordinarily be ascribed to trend.
(e) Table 1 shows the values of Schwarz criterion (BIC) from 6th order polynomial, linear, and quadratic trend models. We will choose the model with the smallest BIC. Hence, the polynomial is the preferred trend specification.

<table>
<thead>
<tr>
<th></th>
<th>Polynomial</th>
<th>Linear</th>
<th>Quadratic</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIC</td>
<td>13.99</td>
<td>16.06</td>
<td>14.81</td>
</tr>
</tbody>
</table>

Table 1: Schwarz Criterion for Various Trend Specifications