1) The most recent recession in the US began in December (Q4) of 2007 and lasted through June (Q2) of 2009. Consider the following data for the 2007 recession:

<table>
<thead>
<tr>
<th>Date</th>
<th>Nominal GDP (Billions)</th>
<th>Price Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007Q4</td>
<td>$14,690</td>
<td>98.0</td>
</tr>
<tr>
<td>2009Q2</td>
<td>$14,342</td>
<td>99.8</td>
</tr>
<tr>
<td>2015Q2</td>
<td>$17,902</td>
<td>109.6</td>
</tr>
</tbody>
</table>

a) Calculate the percentage drop in GDP over the 6 quarters that the recession spanned.

\[
\left( \ln \left( \frac{14,342}{14,690} \right) \right) \times 100 = -2.4\% 
\]

Or

\[
\left( \frac{14,342 - 14,690}{14,690} \right) \times 100 = -2.4\%
\]

b) Calculate the average annual growth over the 4 years since the recession ended.

\[
\left( \frac{\ln (17,902) - \ln (14,342)}{6} \right) \times 100 = 3.7\%
\]

Or,

\[
\left( \frac{17,902}{14,342} \right)^{\frac{1}{6}} - 1 \times 100 = 3.7\%
\]
c) Repeat parts (a) and (b), but use the price information to put your answers in real (inflation adjusted) terms. That is, calculate the real percentage drop in production and the real average annual growth in the four years following.

First, calculate the percentage change in prices over the recession:

\[
\left[ \ln(99.8) - \ln(98) \right] \times 100 = 1.8\%
\]

Or

\[
\left( \frac{99.8}{98} \right) \times 100 = 1.8\%
\]

Then, subtract from your answer in (a).

\[-2.4\% - 1.8\% = -4.2\%
\]

Now, repeat for average annual growth. First, calculate the average annual growth in prices and then subtract from your answer in (b),

\[
\left[ \frac{\ln(109.6) - \ln(99.8)}{6} \right] \times 100 = 1.6\%
\]

Or,

\[
\left[ \left( \frac{109.6}{99.8} \right)^\frac{1}{6} - 1 \right] \times 100 = 1.6\%
\]

Now, subtract....

\[3.7\% - 1.6\% = 2.1\%\]