1. a. Given the following data

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Exp. #1 [NO₂] (M)</th>
<th>Exp. #2 [NO₂] (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.350</td>
<td>1.05</td>
</tr>
<tr>
<td>2</td>
<td>0.289</td>
<td>0.583</td>
</tr>
<tr>
<td>4</td>
<td>0.245</td>
<td>0.324</td>
</tr>
<tr>
<td>8</td>
<td>0.190</td>
<td>0.0999</td>
</tr>
<tr>
<td>16</td>
<td>0.130</td>
<td>0.0095</td>
</tr>
<tr>
<td>24</td>
<td>0.090</td>
<td>0.0009</td>
</tr>
<tr>
<td>40</td>
<td>0.062</td>
<td></td>
</tr>
</tbody>
</table>

for the reaction \(2\text{NO}_2(g) \rightarrow 2\text{NO}(g) + \text{O}_2(g)\)

The data for Exp. #1 is plotted below. Determine the average rate of the reaction between 8 and 24 min., the instantaneous rate of the reaction at 8 minutes, and the initial rate of the reaction.
b. The data for Exp. #2 is plotted below. Determine the average rate of the reaction between 8 and 24 minutes, the instantaneous rate of the reaction at 8 minutes, and the initial rate of the reaction.

\[
\begin{array}{c|c}
\text{Concentration (M)} & \text{Time (minutes)} \\
\hline
0 & 0 \\
0.2 & 0.4 \\
0.4 & 0.6 \\
0.6 & 0.8 \\
0.8 & 1.0 \\
1.0 & 1.2 \\
1.2 & \\
\end{array}
\]

\[
\begin{array}{c|c}
\text{Concentration (M)} & \text{Time (minutes)} \\
\hline
0 & 5 \\
0.2 & 10 \\
0.4 & 15 \\
0.6 & 20 \\
0.8 & 25 \\
1.0 & 30 \\
\end{array}
\]

c. By what factor did the initial concentration change in going from Exp. #1 to Exp. #2?

d. By what factor did the initial rate change in going from Exp. #1 to Exp. #2?

e. Write an equation which describes how the initial rate of the reaction depends on the initial concentration.