1. The following table shows a manufacturer's total cost (in thousands of dollars) to produce from 1 to 14 forklift trucks. Show work and give units for each answer. Round off answers to 3 decimal places.

<table>
<thead>
<tr>
<th># of forklift trucks produced</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost (thousands of dollars)</td>
<td>2.5</td>
<td>4.6</td>
<td>10.6</td>
<td>15.1</td>
<td>17.6</td>
<td>18.6</td>
<td>19.1</td>
</tr>
</tbody>
</table>

(a) (5 points) Label axes appropriately and plot the data.

(b) (5 points) According to the table, what is the percentage change in cost to produce from 6 to 12 forklifts?

\[
\text{percentage change} = \frac{18.6 - 10.6}{10.6} \times 100\% = 75.472\%
\]

(c) (5 points) According to the table, what is the average rate of change in cost to produce from 6 to 12 forklifts?

\[
\text{ARC} = \frac{18.6 - 10.6}{12 - 6} = 1.333 \text{ thousand of $ per forklift}
\]

(d) (3 points) Draw and label a line segment through two of the points that you plotted in part (a) whose slope is given by the answer to part (c).

(e) (5 points) Let \( x \) stand for the number of forklifts produced and let \( C(x) \) stand for the total cost to produce \( x \) forklifts. Fit the best model to the data.

\[
y = \frac{C}{1 + A \cdot e^{bx}} \quad a = 27.472 \quad b = 0.578 \quad c = 19.171
\]

(h) (3 points) Estimate the cost to produce 9 forklifts using the model in part (e).

\[C(9) = 16.654 \text{ thousand of $}\]

(g) (4 points) Use the model in part (e) to approximate the average rate of change in cost to produce from 5 to 9 forklifts.

\[
\text{ARC} = \frac{C(9) - C(5)}{9 - 5} = \frac{9.065}{4} = 2.266 \text{ thousand of $ per forklift}
\]
2. The following graph gives the profit of a company, in millions $, in the years after 1980:

(a) (2points) The average rate of change in the profit from 1987 to 1998 was:
   positive  negative  zero  (circle one)

(b) (2points) In 1989, the instantaneous rate of change of the profit was:
   positive  negative  zero  (circle one)

(c) (2points) The percentage change in profit from 1981 to 1987 was:
   positive  negative  zero  (circle one)

(d) (2points) In 1983, the profit was:
   positive  negative  zero  (circle one)

(e) (2points) In 1988, the profit was:
   increasing  decreasing  neither  (circle one)

(f) (3points) Estimate and list all the x values where the instantaneous rate of change of the profit was zero. Your answer should be a list of specific values not a range of values.
   
   6  17

(g) (3points) Estimate the change in profit from 1981 to 1986 (give units).
   
   \[-20 - 15 = -35 \text{ million $}\]

(h) (4points) Estimate the average rate of change of the profit from 1981 to 1986. Show work, and give your answer with units.

   \[ARC = \frac{-20 - 15}{5} = -7 \text{ million $ per year.}\]