1. [11 points] Reiner recently went for a 5-mile run. Let \( R(t) \) be Reiner’s distance, in miles, \( t \) minutes after he started his run, and let \( C(m) \) be the number of calories that Reiner had burned after running \( m \) miles. A table giving some values of \( R(t) \) and a graph of \( C(m) \) are given below. Assume that the functions are invertible, and note that \( C(m) \) is linear for \( 0 < m < 1.5 \) and \( 4 < m < 5 \).

<table>
<thead>
<tr>
<th>( t )</th>
<th>0</th>
<th>6</th>
<th>10</th>
<th>16</th>
<th>23</th>
<th>27</th>
<th>32</th>
<th>34</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R(t) )</td>
<td>0</td>
<td>0.8</td>
<td>1.3</td>
<td>2.5</td>
<td>3.2</td>
<td>3.8</td>
<td>4</td>
<td>4.4</td>
</tr>
</tbody>
</table>

\[
\begin{array}{c}
\begin{array}{c}
g = C(m) \\
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
0.5 \quad 1 \quad 1.5 \quad 2 \quad 2.5 \quad 3 \quad 3.5 \quad 4 \quad 4.5 \quad 5 \\
50 \quad 100 \quad 150 \quad 200 \quad 250 \quad 300 \quad 350 \quad 400 \quad 450 \quad 500
\end{array}
\end{array}
\]

a. [5 points] Compute the following quantities exactly. If the quantity does not exist, write DNE, or if there is not enough information to compute it exactly, write NEI.

i. [1 points] How many minutes does it take for Reiner to run his first 4 miles?

\[
\text{Answer: } R^{-1}(4) = 32
\]

ii. [2 points] How many calories has Reiner burned after running for 10 minutes?

\[
\text{Answer: } C(R(10)) = 130
\]

iii. [2 points] How many minutes does it take for Reiner to burn his first 300 calories?

\[
\text{Answer: } R^{-1}(C^{-1}(300)) = 16
\]

b. [2 points] Compute the average rate of change of \( C(m) \) from \( m = 1.5 \) to \( m = 4 \). Include units.

\[
\text{Answer: } 100 \text{ calories per mile}
\]

c. [2 points] Estimate \( C'(\pi) \). Include units.

\[
\text{Answer: } \approx 66.7 \text{ calories per mile}
\]

d. [2 points] Estimate Reiner’s instantaneous velocity 34 minutes into his run. Include units.

\[
\text{Answer: } \approx 0.2 \text{ miles per minute}
\]