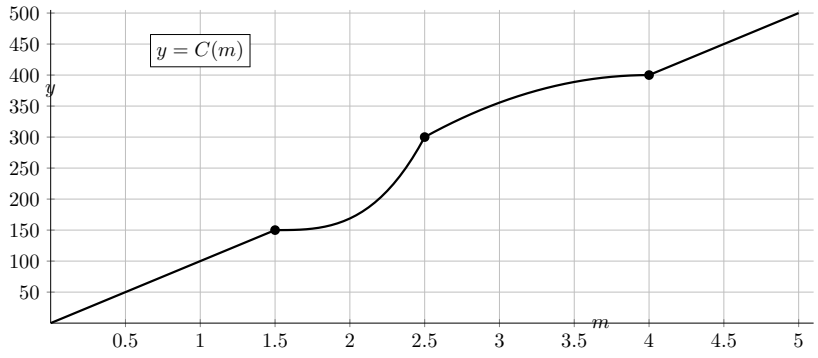
1. [11 points] Reiner recently went for a 5-mile run. Let $R(t)$ be Reiner's distance, in miles, t minutes after he started his run, and let $C(m)$ be the number of calories that Reiner had burned after running m miles. A table giving some values of $R(t)$ and a graph of $C(m)$ are given below. Assume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

t	0	6	10	16	23	27	32	34
$R(t)$	0	0.8	1.3	2.5	3.2	3.8	4	4.4



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?

Answer: $=$ $R^{-1}(4) = 32$

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

Answer: $=$ $C(R(10)) = 130$

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

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.

Answer: $=$ 100 **calories per mile**

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

Answer: $=$ ≈ 66.7 **calories per mile**

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

Answer: $=$ ≈ 0.2 **miles per minute**