3. [12 points] Oakley gets exercise every day in one of two ways: either by walking outside, or following instructions from an exercise app.

- \( f(d) \) is the amount of time, in minutes, it takes Oakley to walk \( d \) miles.
- \( f(d) \) is invertible.
- \( W(t) \) is Oakley’s heart rate, in beats per minutes, \( t \) minutes after they start walking.
- \( A(t) \) is Oakley’s heart rate, in beats per minutes, \( t \) minutes after they start using the exercise app.

a. [8 points] For each of the following, give a practical interpretation of the given expression, or explain why the expression does not make sense in the context of the problem.

i. \( f^{-1}(5) \)
ii. \( W(f(1.5)) = 95 \)
iii. \( W(40) < A(20) \)

Solution:

i. \( f^{-1}(5) \) is the distance in miles that Oakley can walk in 5 minutes.
ii. Oakley’s heart rate after walking 1.5 miles is 95 beats per minute.
iii. Oakley’s heart rate after walking for 40 minutes is less than their heart rate after using the exercise app for 20 minutes.

b. [4 points] Find an expression for Oakley’s average speed, in miles per hour, when Oakley has walked a total of \( d \) miles. Your answer may involve \( f, W, \) and/or \( A \).

Solution: To walk \( d \) miles takes \( f(d) \) minutes, or \( f(d)/60 \) hours. Since average speed is distance traveled over time, the average speed is

\[
\frac{d}{f(d)/60} = \frac{60d}{f(d)}
\]