4. [7 points] On a warm fall day, Schinella decides to walk home from work. Let $d = f(t)$ be the function giving Schinella's distance **from work**, in miles, t minutes after she leaves work.

a. [3 points] Her walk home from work is 3 miles. Schinella wants to write a new function $g(h)$ that gives her distance **from home**, in miles, h **hours** after she leaves work. Write a formula for $g(h)$ in terms of f.

$g(h) =$ $3 - f(60h)$

b. [2 points] Schinella (who is from Canada) wants to write another new function $k(t)$ that gives her distance from work in **kilometers** t minutes after she leaves work. Given that 1 mile is about 1.6 kilometers, circle the correct formula for $k(t)$ below.

$\boxed{1.6f(t)}$ $\quad f(1.6t)$ $\quad \frac{1}{1.6}f(t)$ $\quad f\left(\frac{t}{1.6}\right)$

c. [2 points] Let $c(t)$ be the function that gives the number of episodes of the podcast *Canadaland* that Schinella has listened to in the first t minutes of her walk. Assume that both $c(t)$ and $f(t)$ are invertible. Using those functions or their inverses, write an expression for Schinella's distance from work, in miles, after she's listened to 2.5 episodes of *Canadaland* while walking home.

$f(c^{-1}(2.5))$ miles

5. [13 points]

a. [4 points] A zookeeper has determined that the function $w(t)$ below provides a good model of the weight, in ounces, of a certain kind of snake t years after it hatches.

$$w(t) = -2e^{-(t-16)/5} + 52$$

Find the value of each of the following **as numbers rounded to two decimal places**. Then **briefly interpret** what each quantity means in the context of the problem.

i. $w(0) =$ ≈ 2.93 **Meaning:** When the snake is first born, it weighs approximately 2.93 ounces.

ii. $\lim_{t\to\infty} w(t) =$ 52 **Meaning:** As the snake ages, its weight gets closer and closer to 52 ounces.

(Problem continues on the next page.)