

8. [10 points] Scientists are continuing their study of water temperature at a certain location in Lake Michigan using their underwater drone.

- Let $W(p)$ be the temperature, in degrees Celsius ($^{\circ}\text{C}$), of the water at a depth of p feet.
- Let $T(p)$ be the time, in minutes, that it takes for the drone to descend to a depth of p feet.

Assume that both of these functions are invertible and differentiable.

- a. [2 points] Write a single equation representing the following statement in terms of the functions W , T , and/or their inverses:

It takes the drone 3 minutes to reach water with a temperature of 5.7°C .

Answer: _____

- b. [3 points] Complete the following sentence to give a practical interpretation of the equation

$$W'(50) = -0.2.$$

Compared to the water at a depth of 50 feet, the water at a depth of 53 feet...

- c. [3 points] Use a complete sentence to give a practical interpretation of the equation

$$\int_{50}^{65} T'(p) dp = 1.$$

- d. [2 points] Which of the following expressions gives the average temperature, in $^{\circ}\text{C}$, of the water outside of the drone during the first 5 minutes of its descent? Circle the one correct answer.

i. $\frac{1}{5} \int_0^5 W(p) dp$

iv. $\frac{W(T^{-1}(5)) - W(T^{-1}(0))}{5}$

ii. $\frac{1}{5} \int_0^5 W(T^{-1}(t)) dt$

v. $\frac{W(T(5)) + W(T(0))}{2}$

iii. $\frac{1}{5} \int_0^5 W'(T(t)) \cdot T'(t) dt$

vi. $\frac{T(W^{-1}(5)) - T(W^{-1}(0))}{5}$