

8. [11 points] Let $W(t)$ be the temperature, in degrees Fahrenheit, of a cake t minutes after it is put in the oven. Assume $W(10) = 220$.

- a. [3 points] Give a practical interpretation of the statement $\int_5^{10} W'(t)dt = 120$.

Solution: Between minutes five and ten in the oven, the cake's temperature increases by 120°F .

- b. [3 points] Give a practical interpretation of the statement $\frac{1}{2} \int_3^5 W(t)dt = 80$.

Solution: Between minutes three and five in the oven, the cake's average temperature is 80°F .

- c. [3 points] Write a single mathematical equation describing the following statement: The average temperature of the cake over the first five minutes in the oven is the same as its temperature after three minutes in the oven.

Solution:

$$\frac{1}{5} \int_0^5 W(t)dt = W(3)$$

- d. [2 points] Assuming all of the above statements in (a)-(c) are true, what will the temperature of the cake be five minutes after it is put in the oven?

Solution: From (a), we deduce $W(10) - W(5) = 120$. So $220 - W(5) = 120$, which means $W(5) = 100^\circ\text{F}$.