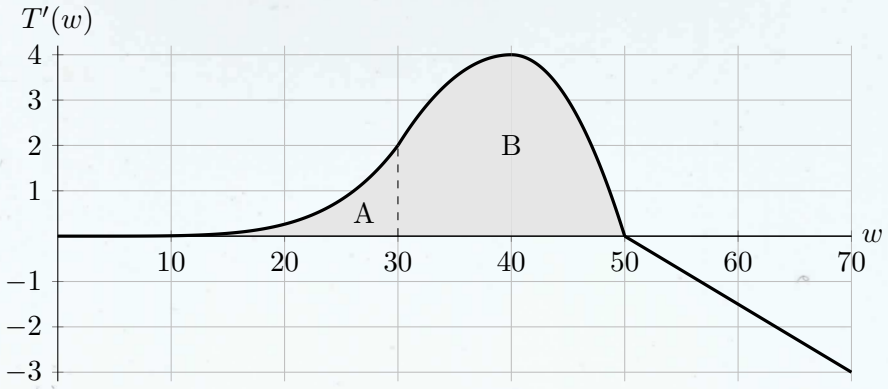
**1**. [6 points] Suppose that the yield of the tomato plants in a particular Michigan garden is a function of the amount of water that the plants receive (from rainfall and irrigation). Let $T(w)$ be the seasonal yield (in pounds) of the tomato plants in a season when the plants receive $w$ gallons of water every week. A portion of the graph of $T'(w)$ (the derivative of $T(w)$) is shown below.
Note that $T'(w)$ is linear for $50 \le w \le 70$. Let $A$ be the area of the region between the $w$–axis and the graph of $T'(w)$ for $0 \le w \le 30$, and let $B$ be the area of the region between the $w$–axis and the graph of $T'(w)$ for $30 \le w \le 50$,




**a**. [2 points] If the tomato plants yield 150 pounds of tomatoes when the plants receive 70 gallons of water every week, how many pounds of tomatoes would the plants yield in a season when they receive 30 gallons of water each week? (Your answer may involve the constants $A$ and $B$.)

$T(70) - T(30) = \int_{30}^{70} T'(w)\,dw = B - \frac{1}{2}(20)(3) = B - 30$

So $T(30) = T(70) - [B-30] = 150 - [B-30] = 180 - B$

**Answer:** 180 − B pounds

**b**. [2 points] In order to maximize the yield of the tomato plants, how many gallons of water should the plants receive each week? (Round to the nearest 5 gallons.)

T' : + | − , so max at 50

**Answer:** 50 gallons

**c**. [2 points] Consider the integral $\int_{10}^{30} T'(w)\,dw$.
Rank the following four estimates of the value of this integral in order from least to greatest by writing them in the correct order on the answer blanks below:

LEFT(10) RIGHT(10) TRAP(10) MID(10)

T' increasing so LEFT < ∫ < RIGHT
T' conc up so MID < ∫ < TRAP

LEFT(10) < MID(10) < TRAP(10) < RIGHT(10)