

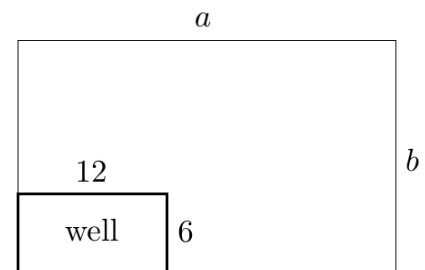
7. [13 points] Suppose that  $f(t)$  is a differentiable, increasing function defined for all real numbers. Some values of  $f(t)$  are listed in the table below. Assume that  $f'(t)$  is continuous.

$t$	2.5	3.1	4.0	4.5	5.5	7.0	8.5	9.4	10	10.5	12.5
$f(t)$	3.2	4.5	6.5	7.2	8.5	9.2	9.8	10.5	11.2	12.5	14.5

- a. [2 points] Compute  $\int_4^7 f'(t)dt$  **exactly**, or write NEI if there is not enough information to do so.
- b. [2 points] Compute the average value of  $f'(t)$  on the interval  $[4.5, 10]$  **exactly**, or write NEI if there is not enough information to do so.
- c. [2 points] Estimate  $f'(9)$ .
- d. [2 points] Use a left-hand Riemann sum with five equal subdivisions to estimate  $\int_{2.5}^{10} f(t)dt$ . Write out all the terms in your sum.
- e. [2 points] Does your answer to part **d.** overestimate, underestimate, or equal the value of  $\int_{2.5}^{10} f(t)dt$ ? Explain your answer.
- f. [3 points] Use a right-hand Riemann sum with four equal subdivisions to estimate  $\int_{4.5}^{12.5} f^{-1}(t)dt$ . Write out all the terms in your sum.

8. [7 points] Gretchen wants to build a rectangular garden that includes a well on her property. The well sits on a 12 foot by 6 foot concrete base. Gretchen's plans for the garden, which will have length  $a$  feet and width  $b$  feet, are as shown.

Gretchen plans to build a rectangular fence around her entire garden, including on the two outside edges of the well. In addition, she wants the usable area of the garden, that is, the area in the garden other than the base of the well, to be 600 square feet.



- a. [2 points] Find a formula for  $a$  in terms of  $b$ .
- b. [2 points] Find a formula for  $F(b)$ , the amount of fence, in feet, that Gretchen needs to build her garden. Your formula should be in terms of  $b$  only.
- c. [3 points] What is the domain of the function  $F(b)$ ?