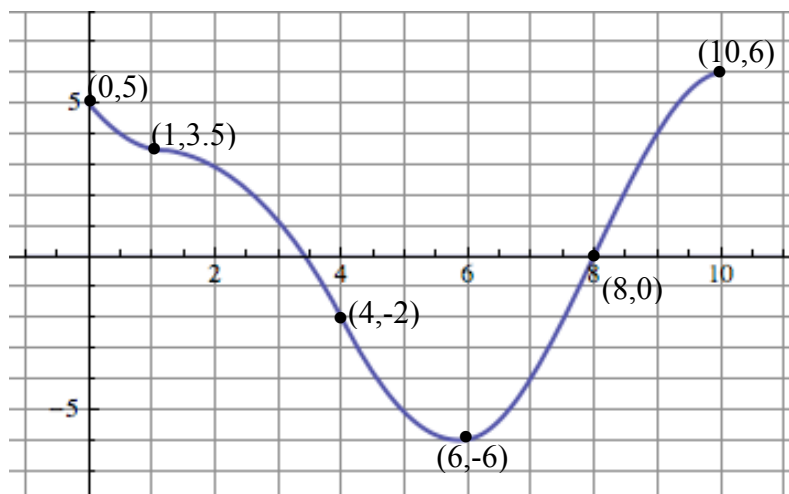
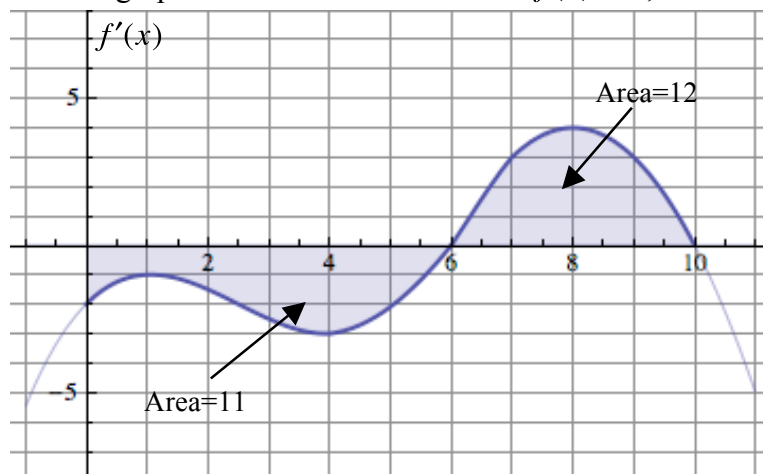


4. (40 points) The graph of  $f'(x)$  is shown in the graph below. Given the fact that  $f(0) = 5$ , sketch a rough graph of  $f(x)$  on the blank axes provided for the domain  $[0,10]$ . You should indicate all critical points, inflection points, and function values (if applicable).



Students should note (graphically or otherwise) that the function is decreasing on  $[0,6]$  and increasing on  $[6,10]$ . There's a local min at  $x=6$ . The function is concave up on  $[0,1] \cup [4,8]$  and concave down on  $[1,4] \cup [8,10]$ . In addition to  $f(0) = 5$ , we can use FTC to find other function

values. For example,  $-11 = \int_0^6 f'(x) dx = f(6) - f(0)$  and  $f(0) = 5$  to get  $f(6) = -6$ . Similarly

$f(10) = 6$ . Other relevant points are inflection points at  $(1, 3.5)$ ,  $(4, -2)$ , and  $(8, 0)$  (found by estimating area under the graph). Critical points exist at  $(6, -6)$  and  $(10, 6)$  since  $f' = 0$ .