

9. (4 points) Let  $f, g$  be functions such that  $f''(x) > 0$  and  $g''(x) < 0$  for all  $x$ . In how many points can the graphs of  $f$  and  $g$  intersect? Circle all possible answers.

(i) no points

(ii) 1 point

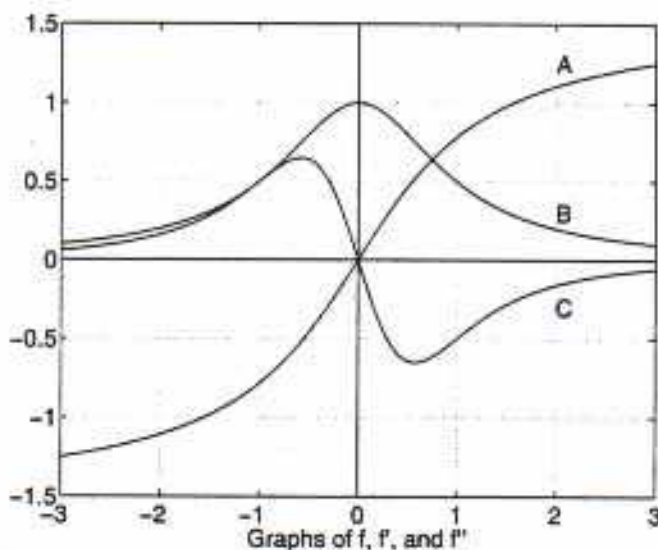
(iii) 2 points

(iv) 3 points

(v) infinitely many points

*NPC*

10. (7 points) (a) The figure below shows graphs of a function  $f$  and its first and second derivatives,  $f'$  and  $f''$ . Identify by the label on the graph which function is  $f$ , which is  $f'$ , and which is  $f''$ .



A is the graph of  $f$

B is the graph of  $f'$

C is the graph of  $f''$

(b) Give a clear explanation of your reasoning for the choices you made in part (a).

*Graph A cannot be the derivative of any other function since all functions are decreasing for  $x < 0$ . Thus, A is  $f$ . Since A is increasing for all  $x$ ,  $B$  is positive for all  $x$ , B is  $f'$ . Graph C is positive when B is increasing ( $\hookrightarrow$  when A is concave up)  $\wedge$  C is negative when B is decreasing ( $\hookrightarrow$  when A is concave down), so C is  $f''$ .*