9. [10 points] The function $f(x)$ is twice-differentiable. Some values of f and f' are given in the following table. In addition, it is known that $f''(x)$ is positive.

x	0	1	2	3	4
$f(x)$	7	6	7	9	12
$f'(x)$	-2	$\frac{1}{2}$	1	2	4

No partial credit will be given on any part of this problem.

a. [4 points] **Circle** any statement which is true, and **draw a line through** any statement which is false.

(i.) For some value of x with $0 < x < 1$, f has a critical point.

(ii.) ~~For some value of x with $1 < x < 2$, f has a critical point.~~

(iii.) ~~For some value of x with $2 < x < 3$, f has a critical point.~~

(iv.) ~~For some value of x with $3 < x < 4$, f has a critical point.~~

b. [3 points] If possible, find the global minimum value of $f(x)$ on the closed interval $[0, 4]$. (Give the y-coordinate, not the x-coordinate.) Do not give an approximation. If it is not possible to find it exactly, write "IT IS NOT POSSIBLE TO FIND IT EXACTLY."

Solution: We know that $f(x)$ is decreasing until some critical point p between 0 and 1 and is increasing after that (because we know that f' goes from negative to positive between 0 and 1 and never becomes negative again, since $f'' > 0$). The minimum occurs at some point that's not included in the table, so IT IS NOT POSSIBLE TO FIND IT EXACTLY.

c. [3 points] If possible, find the global maximum value of $f(x)$ on the closed interval $[0, 4]$. (Give the y-coordinate, not the x-coordinate.) Do not give an approximation. If it is not possible to find it exactly, write "IT IS NOT POSSIBLE TO FIND IT EXACTLY."

Solution: The only critical point is a local minimum, so the maximum value must be at one of the endpoints. Looking at the table, we see the maximum value is 12 (when $x = 4$).