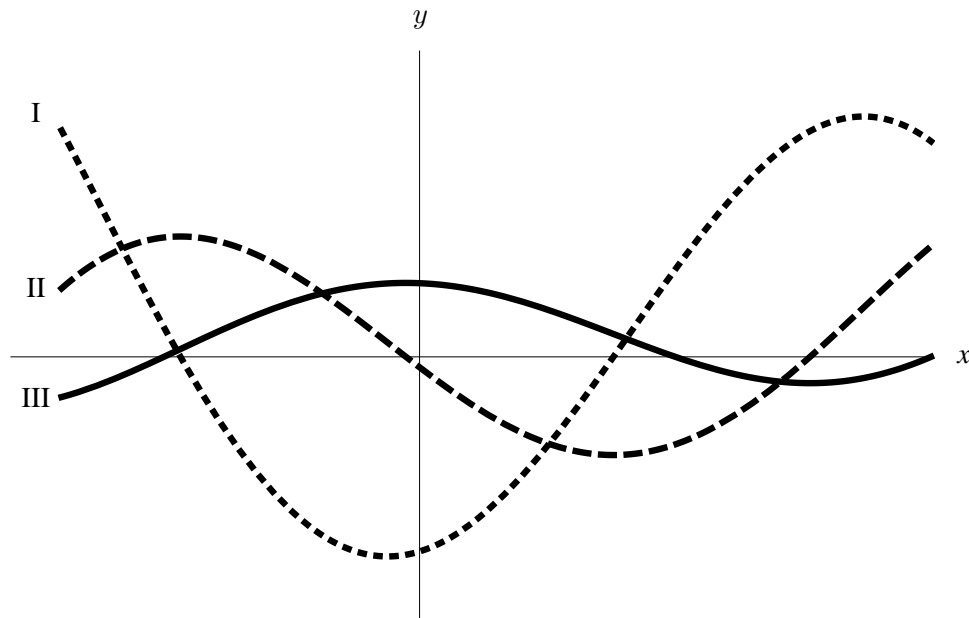**7**. [12 points] On the axes below are graphed f, f', and f''. Determine which is which, and justify your response with a brief explanation.

Solution: Looking to the far right of the graph, curve **I** has a critical point where it has a slope of zero. At this x-coordinate neither of the other graphs has a root. This means the derivative of **I** is not in this figure, so **I** must be f''. Looking to the far left of the graph, **II** has a local maximum where its derivative is zero. Although **III** has a root near the same x-value, **III** changes sign from negative to positive at this point. By the first derivative test, **III** cannot be the derivative of **II**. Thus, by process of elimination, **II** must be f' and **III** must be f.

f:_____**III**_____

f':_____**II**_____

f'':_____**I**_____