Name _____ **Problem Set 7**

"For the problem sets that you get for homework, DO THEM, they are very helpful in terms of keeping things somewhat fresh in your mind and helping you re-learn them in the future. I did them and what I got many things wrong on the first practice AP exam, I was able to very easily see the error since I remembered a topic that was in the back of my mind." A 2019 Nerd

FR1. 1973 – AB 3 **(No Calculator)**

Given $x^2 + xy + 2y^2 = 8$:

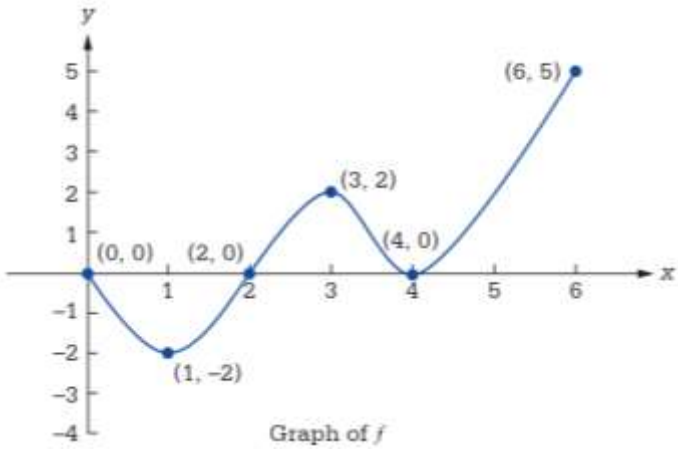
a) Find an expression for the slope of the curve at any point (x, y) on the curve.

b) Write an equation for the tangent line to the curve at the point $(2,1)$.

c) Find the coordinates of all other points on this curve with slope equal to the slope at $(2,1)$.

FR2. 2019 New FRQ **(No Calculator)**

The figure shows the graph of f, a twice-differentiable function. The graph of f has horizontal tangent lines at $x=1$, $x=3$ and $x=4$. The areas of the regions bounded by the $x-$axis and the graph of f on the intervals $[0,2]$ and $[2,4]$ are 2.5 and 2, respectively. Let $H(x)=\int_0^x f(t)\,dt$.



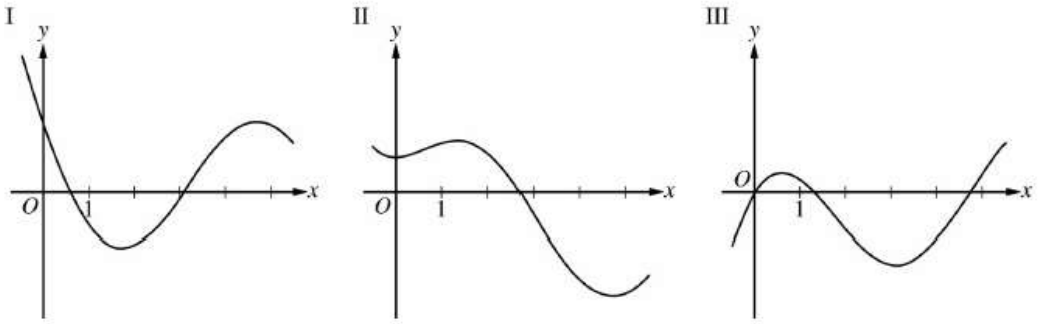
a) On what open intervals contained in $(0,6)$ is the graph of H both concave up and increasing? Give a reason for your answer.

b) Find the $x-$coordinates of all points of inflection for the graph of H. Justify your answer.

c) Let $G(x)=2x+\int_0^x f(t)\,dt$. Find the critical points of x and classify each as a local maximum, local minimum or neither. Justify your answer.

d) Let $J(x)=x\cdot\int_0^x f(t)\,dt$. Find $J'(2)$.

MC1.



Three graphs labeled I, II, and III are shown above. One is the graph of f, one is the graph of f', and one is the graph of f''. Which of the following correctly identifies each of the three graphs?

	f	f'	f''
(A)	I	II	III
(B)	II	I	III
(C)	II	III	I
(D)	III	I	II

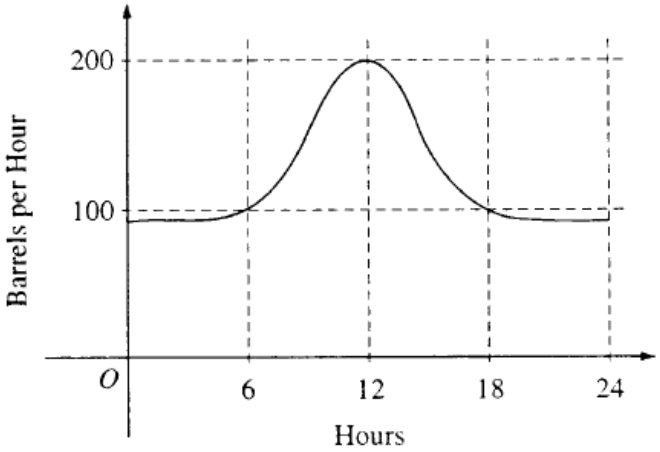
MC2. $\int_2^3 \frac{x}{x^2+1}dx =$

(A) $\frac{1}{2}\ln\frac{3}{2}$ (B) $\frac{1}{2}\ln 2$ (C) $\ln 2$ (D) $2\ln 2$

MC3. What are all values of k for which $\int_{-3}^{k} x^2 dx = 0$?

(A) -3 (B) 0 (C) 3 (D) -3 and 3

MC4.



The flow of oil, in barrels per hour, through a pipeline on July 9 is given by the graph shown above. Of the following, which best approximates the total number of barrels of oil that passed through the pipeline that day?

(A) 500 (B) 600 (C) 2,400 (D) 3,000