Name _____ **Problem Set 2**

"The Free Response problem sets I kind of took for granted and just saw it as another piece of homework we had to do, but I never really realized how much help they were when it came to the AP test" A 2019 Nerd

FR1. 1977 – AB 4 **(No Calculator)**

Let f and g be differentiable functions and let the values of f, g, and the derivatives f' and g' at $x=1$ and $x=2$ be given by the table below:

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	5	2	3	4
2	1	π	7	6

Determine the value of each of the following:

a) The derivative of $f(x)+g(x)$ at $x=2$.

b) The slope of the tangent line of $k(x)$, where $k(x)=f(x)g(x)$, at $x=2$.

c) The position, in meters, of a particle is given by $p(x)=\dfrac{f(x)}{g(x)}$, where x is measured in minutes. Using correct units, find the velocity of the particle at $x=2$.

d) $h'(1)$ where $h(x)=f(g(x))$.

FR2. 1981 – AB 5 **(No Calculator)**

Let $f(x)=\begin{cases} x^2+3x-5 & x<2 \\ 8x+c & x\geq 2 \end{cases}$

a) Evaluate $\lim\limits_{x\to 2^-} f(x)$

b) What value of c will make $f(x)$ continuous? Justify your answer.

c) Given the value of c found in b), is $f(x)$ differentiable at $x=2$? Explain your reasoning.

MC1. $\frac{d}{dx}\left(\frac{1}{x^3}-\frac{1}{x}+x^2\right)$ at $x=-1$ is

(A) -6 (B) -4 (C) 0 (D) 2

MC2. An equation of the line tangent to the graph of $y=\frac{2x+3}{3x-2}$ at the point $(1,5)$ is

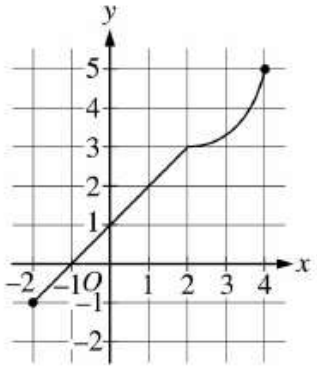
(A) $13x+y=18$

(B) $x-13y=64$

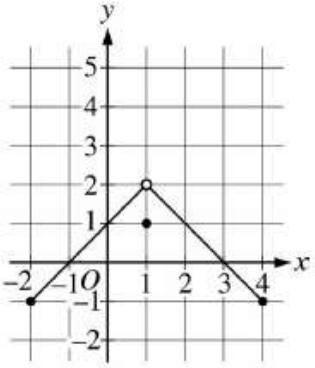
(C) $x+13y=66$

(D) $-2x+3y=13$

MC3.



Graph of f



Graph of g

The graphs of the functions f and g are shown above. The value of $\lim_{x\to 1} f(g(x))$ is

(A) 1

(B) 2

(C) 3

(D) nonexistent