AP CALCULUS BC	YouTube Live Virtual Lessons	Mr. Bryan Passwater Mr. Anthony Record
Topic: All Units	**Free Response Question Stem Types** **Verbal Interpretations, Explanations & Reasoning**	**Date:** April 30, 2020

Free Response Questions Stem Types: Verbal

2020 FRQ Practice Problem BC1

t (minutes)	0	1	4	6	10
$E'(t)$ (students/minute)	21	18	8	3	1

BC1: When Mr. Passwater starts his live online help session for his AP Calculus students, there are 25 students in the session. For $0 \le t \le 10$ minutes, students enter the online session at a rate modeled by the differentiable function, $E'(t)$, where $E'(t)$ is decreasing and measured in students per minute.

(**a**) Use the data in the table to approximate $E''(5)$. Using correct units, interpret the meaning of $E''(5)$ in the context of the problem.

(**b**) Is there a time t, $0 < t < 10$, at which $E''(t) = -2$? Justify your answer.

The problem has been restated.

t (minutes)	0	1	4	6	10
$E'(t)$ (students/minute)	21	18	8	3	1

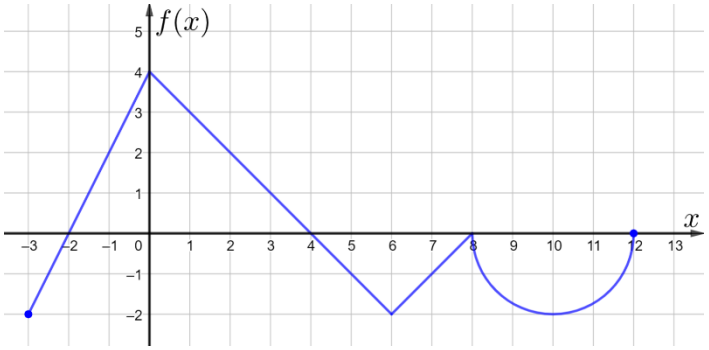
BC1: When Mr. Passwater starts his live online help session for his AP Calculus students, there are 25 students in the session. For $0 \leq t \leq 10$ minutes, students enter the online session at a rate modeled by the differentiable function, $E'(t)$, where $E'(t)$ is decreasing and measured in students per minute.

(**c**) Using correct units, explain the meaning of $\int_0^{10} E'(t)dt$ in the context of the problem. Use a right Riemann with the four subintervals indicated in the table to estimate $\int_0^{10} E'(t)dt$.

(**d**) Is the approximation in part (b) an overestimate or underestimate of $\int_0^{10} E'(t)dt$? Give a reason for your answer.

(**e**) A tangent line to the graph of $y = E(t)$ at $t = 0$ is used to approximate $E(1)$. Does this approximation overestimate or underestimate $E(1)$? Give a reason for your answer.

Free Response Questions Stem Types: Verbal
2020 FRQ Practice Problem BC2



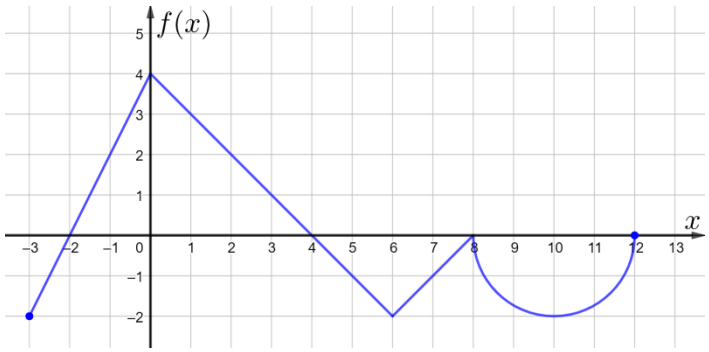
BC2: The function f is defined on the closed interval $[-3, 12]$. The graph of f, shown in the figure above, consists of three line segments and a semicircle centered at $(10, 0)$. Let g be the function defined by $g(x) = \int_4^x f(t)dt$.

(**a**) Find all value(s)of x on the open interval $-3 < x < 12$ for which the function g has a local maximum. Justify your answer.

(**b**) On what open intervals contained in $-3 < x < 12$ is the graph of g both concave up and decreasing? Explain your reasoning.

(**c**) For $-3 < x < 12$, find all values of x for which the graph of g has a point of inflection. Explain your reasoning.

The problem has been restated.



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(**d**) Determine the minimum value of g on the closed interval $[-3, 12]$. Justify your answer.

(**e**) Find $\lim_{x\to 3} \dfrac{g(2x) + x - 1}{1 - e^{f(x+1)}}$.

(**f**) Let $H(x) = \begin{cases} \dfrac{x}{g(x)} & x < 8 \\ -2\ln|e + f(x)| & x \geq 8 \end{cases}$. Is $H(x)$ continuous at $x = 8$? Why or why not?