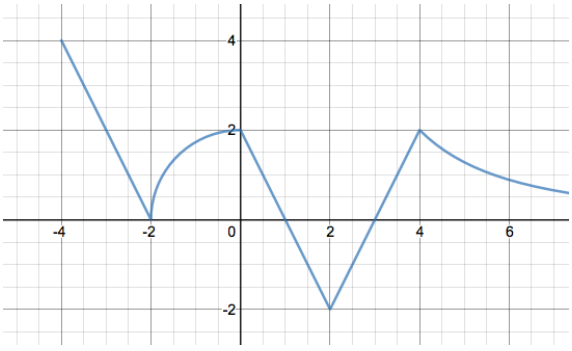
BC Calculus **Name**_____

2020 Exam Practice

FR #1 (25 minutes: 15 points)

Set a timer for 25 minutes to complete this problem. You may use your notes, textbooks, or any materials I gave you throughout the year. You are not expected to use a calculator, but you may use one if you would like. You should show all your steps as if you did not have a calculator. I am guessing that the 25-minute problem will be worth 15 points and the 15-minute problem will be worth 10 points for a total of 25 points. The college board has said that the 25-minute problem will be worth 60% and the 15-minute problem will be worth 40%, so that is my best guess at how it may be broken down this year. Please show all appropriate mathematics: no bald answers!

The graph of f', consisting of 3 line segments, a quarter circle, and a portion of the graph of $y = \frac{32}{x^2}$, is shown below. It is known that $f(0) = 5$.



Graph of f'

a) On the interval [-4,6], find all x-values at which $f(x)$ has relative maxima and relative minima. Give a reason for your answers. [3 points]

b) On the interval [-4,6], find all x-values at which $f(x)$ has points of inflection. Give a reason for your answer. [3 points]

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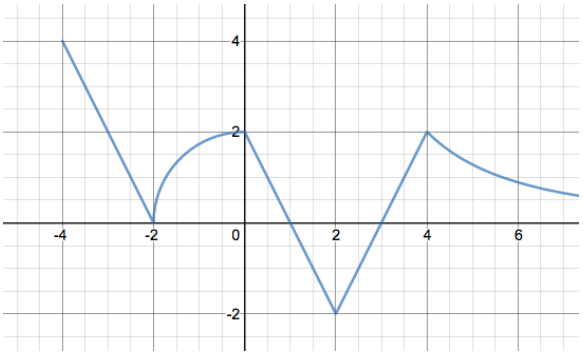

Graph of f'

c) Write an expression for $f(x)$ that includes an integral. Use that expression to find the values of $f(1)$ and $f(3)$. [3 points]

d) On the interval [-4,6], find the absolute maximum and absolute minimum values of $f(x)$. Justify your answers. [3 points]

e) Find the area of the region bounded by the x-axis, the vertical line $x = 4$, and the portion of the graph of $y = \frac{32}{x^2}$. (Note that there is no upper bound, so this will be an improper integral.) [3 points]