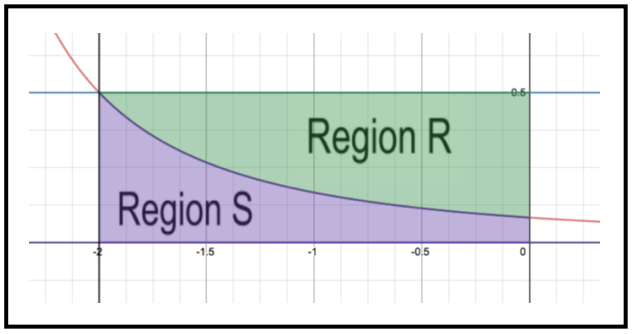
BC Calculus **Name**_____

2020 Exam Practice

FR #3 (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!

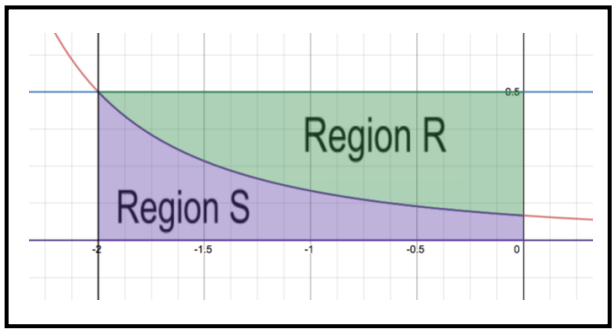
As shown in the graph below, Region R is bounded by the function $f(x) = \frac{1}{x^2+7x+12}$, the horizontal line $y = 0.5$, and the vertical line $x = 0$. Region S is bounded by $f(x) = \frac{1}{x^2+7x+12}$, the horizontal line $y = 0$, and the vertical lines $x = -2$ and $x = 0$.



a) Using the method of Partial Fractions, set up and evaluate a definite integral to find the area of Region S. [3 points]

b) Show the setup of an integral that could be used to find the area of Region R. You DO NOT need to evaluate the integral. [2 points]

As shown in the graph below, Region R is bounded by the function $f(x) = \frac{1}{x^2+7x+12}$, the horizontal line $y = 0.5$, and the vertical line $x = 0$. Region S is bounded by $f(x) = \frac{1}{x^2+7x+12}$, the horizontal line $y = 0$, and the vertical lines $x = -2$ and $x = 0$.



c) Show the setup of the integral that would yield the volume of the solid formed when Region S is rotated about the x-axis. You DO NOT need to evaluate the integral. [2 points]

d) Region R is the base of a solid with cross-sections perpendicular to the x-axis that are squares. Show the setup of the integral that would yield the volume of the solid. You DO NOT need to evaluate the integral. [2 points]

e) Show the setup of the integral that would yield the volume of the solid formed when Region R is rotated about the y-axis. You DO NOT need to evaluate the integral. [2 points]

f) Write an expression including an integral that would yield the perimeter of Region S. You DO NOT have to evaluate the integral portion of the expression. [4 points]