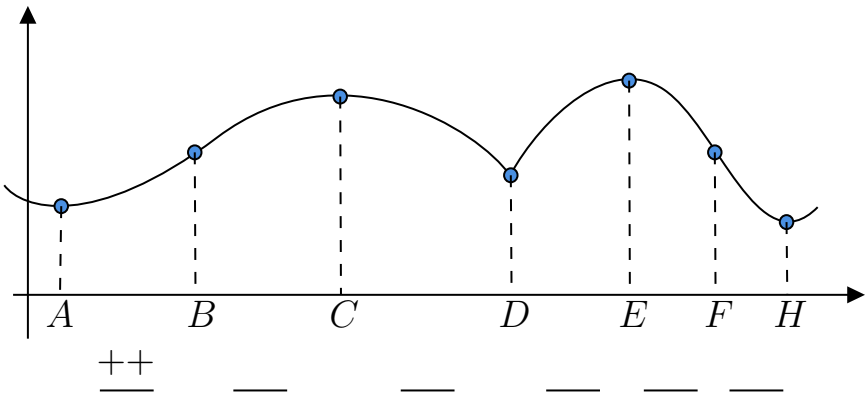
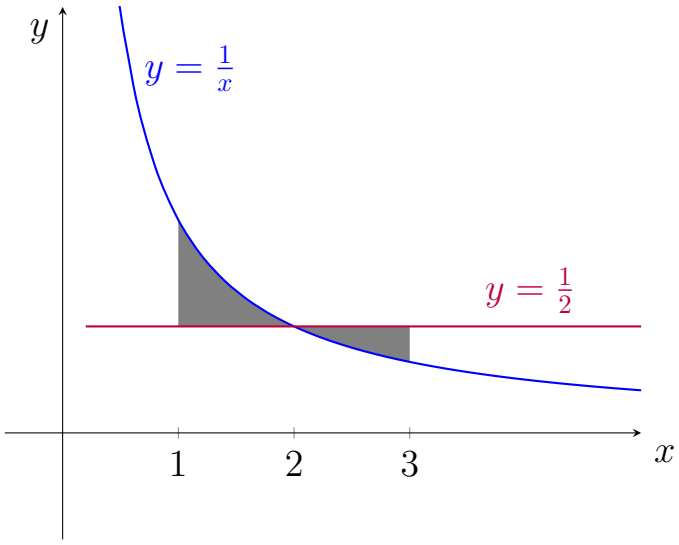
Name: **Date:** **Quiz 3** **AP Calculus - Hargus**

1. (10 points) Label each section on the following graph with the sign combination of $f'(x)$ and $f''(x)$. (For example, between A and B you would write $++$ because $f'(x) > 0$ and $f''(x) > 0$)

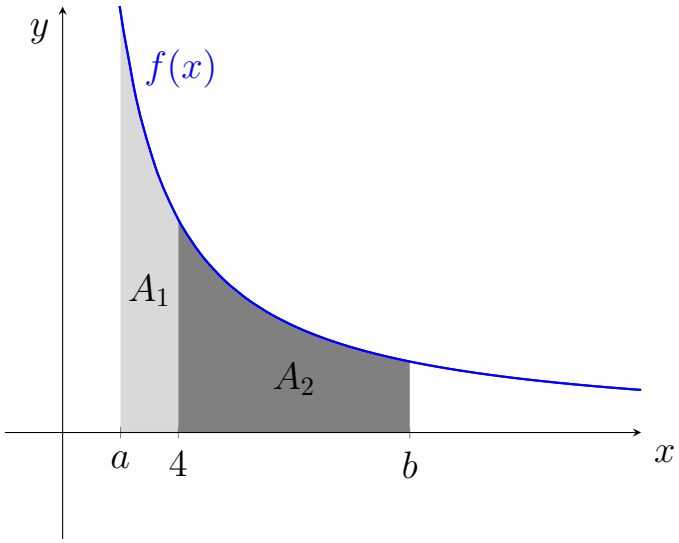


2. (10 points) Write an expression (just using integral(s) is okay, here you do not need to calculate the answer) for the gray area below between $y = \frac{1}{x}$ and $y = \frac{1}{2}$ from $x = 1$ to $x = 3$.



Area = _____

3. (10 points) Given that the area $A_1 = 5$ and $\int_a^b f(x)dx = 11$, what is A_2 in the graph below?



$A_2 =$ _____

4. (10 points) Solve the integral.

   (a) $\int \cos(x)dx =$

   (b) $\int (4x^2 - 2e^x)dx =$

5. (10 points) Suppose that $f'(3) = 0$. If $f''(3) < 0$, what does the graph of $f(x)$ have at $x = 3$? (circle one answer)

   (a) Maximum

   (b) Minimum

   (c) Point of inflection

6. (20 points) Find the critical points for the function $f(x) = x^3 - 4x^2 + 4x + 1$. Then, find the transition points and draw a sign chart for $f'(x)$ and $f''(x)$ showing the intervals where each function is positive or negative. Then, use this information to sketch the graph $f(x)$ below (label any minimums, maximums, and points of inflection).