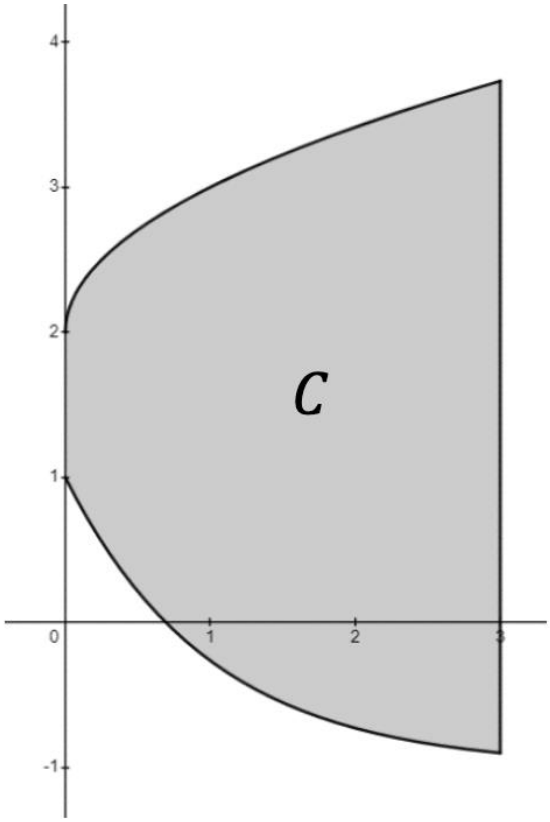
2023 AP Daily: Practice Sessions

AP Calculus AB

Session 7 – FRQ (No Calculator)



Let C be the region enclosed by the graphs of $m(x) = 2e^{-x} - 1$ and $v(x) = \sqrt{x} + 2$, the y-axis, and the vertical line $x = 3$, as shown in the figure.

a. Find the area of C.

b. Region C is the base of a solid. For the solid, at each x the cross section perpendicular to the x-axis is a rectangle with height x. Write but do not evaluate, an integral expression that gives the volume of the solid.

c. Write, but do not evaluate, an integral expression that gives the volume of the solid generated when C is rotated about the horizontal line $y = -2$.

d. Write a function $d(x)$ to express the vertical distance between $m(x)$ and $v(x)$ at any value x. Find the rate at which $d(x)$ is increasing at $x = 1$.

All problems written by Mark & Virge