

1. Compute the following integrals:

(a) $\int \frac{\cos x}{1 - \sin x} dx$

(b) $\int \frac{x}{\sqrt{1 - 2x^2}} dx$

(c) $\int_{-1}^0 t(t + 1)^{11} dt$

2. Find the area bounded between the curves $y = x$ and $y = x^2 - 6$ from $x = 0$ to $x = 5$.

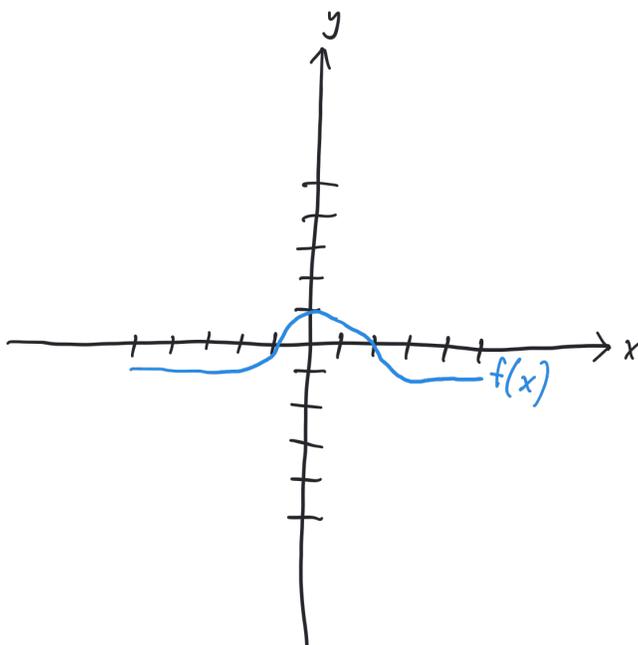
3. Consider the region bounded by $y = x^2 - 4x$ and the x -axis.

(a) What's the volume of this region rotated around the x -axis?

(b) What's the volume of this region rotated around the axis $y = 1$?

4. Consider the pyramid whose base is a 1×1 square and whose top vertex is at height 1 above the square. Find its volume using an integral.

5. Consider the graph of f shown below:



Let $g(x) = \int_0^x f(t) dt$.

Find $g(0)$, $g'(0)$, and $g'(2)$. Sketch $g(x)$.

6. The concentration of live virus in a petri dish declines exponentially over the course of a day. After t hours, the concentration of virus is e^{-3t} times its original level.

What is the average level of virus throughout the day (i.e., from time $t = 0$ to $t = 24$)?