

1. The region shown, R , is the region bounded by the graphs of $y = e^x$, $y = 1$, and $x = 2$.
 - a) Calculate the area of R .
 - b) Set up a different integral for the area of R that is evaluated dy instead of dx . DO NOT EVALUATE.
 - c) Set up an integral for the volume of the solid generated by rotating R about the x -axis using disks/washers. DO NOT EVALUATE.
 - d) Set up a different integral for the same volume using shells. DO NOT EVALUATE.
 - e) Set up an integral expressing the volume of the solid generated by rotating R about the vertical line $x = -1$. DO NOT EVALUATE.

2. Suppose that $f(x)$ and $g(x)$ are inverse functions and that $f(x)$ satisfies the following chart:

x	$f(x)$	$f'(x)$
1	-3	2.5
2	-2	2
3	1	3
4	3	3.5
5	4	1.5

Determine $g'(3)$.

3. Suppose that $f(x)$ is decreasing and concave up.
 - a) Explain why $f(x)$ has an inverse function.
 - b) Is the inverse function increasing, decreasing, or not necessarily either?
 - c) Is the inverse function concave up, concave down, or not necessarily either?
4. Find the derivatives of the following. Simplify if convenient.
 - a) $f(t) = e^{\tan^{-1} t}$.
 - b) $g(x) = \sin^{-1} \sqrt{x}$.
 - c) $h(r) = \ln \frac{\sqrt[4]{r^9+1}}{\sqrt[3]{r^4+1}}$.
5. Evaluate the following integrals
 - a) $\int_1^{\sqrt{3}} \frac{1}{1+x^2} dx$
 - b) $\int_1^{\sqrt{3}} \frac{x}{1+x^2} dx$
 - c) $\int e^x (1 + e^{e^x}) dx$
6. Use logarithmic differentiation to find $\frac{dy}{dx}$ for

$$y = x^{2x} \ln x.$$