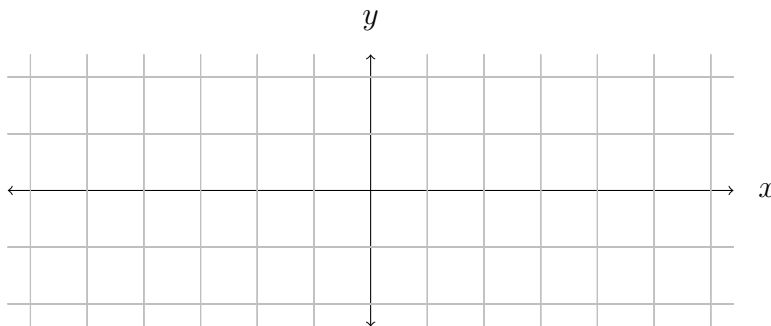


5 February 2015

Let $f : \mathbf{R} \rightarrow \mathbf{R}$ and $g : \mathbf{R} \rightarrow \mathbf{R}$ be two functions that are strictly decreasing, with $f(x) \geq g(x)$ for all x . Let $a, b, c, d \in \mathbf{R}$ be such that $f(a) = g(a) = d$ and $f(b) = g(b) = c$. Let R be the region on the plane bounded by $f(x)$ and $g(x)$ on the interval $[a, b]$.

1. Explain what it means for a function to be “decreasing,” “strictly decreasing,” or “non-increasing.”
2. Draw f and g on the grid below and indicate the region R . Label the axes $x = a$, $x = b$, and $y = c$, $y = d$.



3. Let $e, h \in \mathbf{R}$ be such that $e < a$ and $h < c$. Write down, but do not evaluate, the formulas for the volumes of revolution made by rotating R around the axes $x = e$ and $y = h$.
4. If $e > b$ or $h > d$, will your answer to part 3 change? Why or why not? If yes, how?
5. What happens to the formulas in part 3 if $a < e < b$ or $c < h < d$?