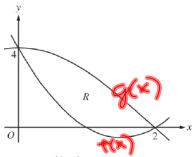
AP Calculus AB
Monday, May 5, 2014

Let's work through the "13 errors" paper unless you have other questions.



5. Let $f(x) = 2x^2 - 6x + 4$ and $g(x) = 4\cos\left(\frac{1}{4}\pi x\right)$. Let R be the region bounded by the graphs of f and g, as shown in the figure above.
   (a) Find the area of R.
   (b) Write, but do not evaluate, an integral expression that gives the volume of the solid generated when R is rotated about the horizontal line $y = 4$.
   (c) The region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is a square. Write, but do not evaluate, an integral expression that gives the volume of the solid.

(a) $\int_0^2 [g(x) - f(x)]\,dx$

$\int_0^2 [4\cos(\frac{\pi}{4}x) - (2x^2 - 6x + 4)]\,dx$

$\int_0^2 (4\cos(\frac{\pi}{4}x) - 2x^2 + 6x - 4)\,dx$

$4\int_0^2 \cos\frac{\pi}{4}x\,dx - \int_0^2 2x^2\,dx + \int_0^2 6x\,dx - \int_0^2 4\,dx$

$u = \frac{\pi}{4}x$

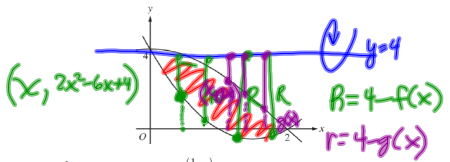
$du = \frac{\pi}{4}dx$

$\frac{4}{\pi}du = dx$

$4\int_0^{\pi/2} (\cos u)\frac{4}{\pi}du - \int_0^2 2x^2\,dx + \int_0^2 6x\,dx - \int_0^2 4\,dx$

$\frac{16}{\pi}\sin u\Big|_0^{\pi/2} - \frac{2x^3}{3}\Big|_0^2 + 3x^2\Big|_0^2 - 4x\Big|_0^2$

$\frac{16}{\pi}\cdot\sin\frac{\pi}{2} - \frac{16}{\pi}\sin 0 - \frac{2^4}{3} - -0 + 3\cdot 2^2 - 0 - 4\cdot 2 - 0$



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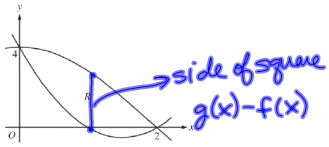
(b) $\pi\int_0^2 [4 - f(x)]^2 - [4 - g(x)]^2\,dx$



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$\int_0^2 [g(x) - f(x)]\,dx$