

Let f and g be the functions given by $f(x) = 2x(1-x)$ and $g(x) = 3(x-1)\sqrt{x}$ for $0 \leq x \leq 1$

The graphs of f and g are shown above.

(a) Find the area of the shaded region enclosed by the graphs of f and g

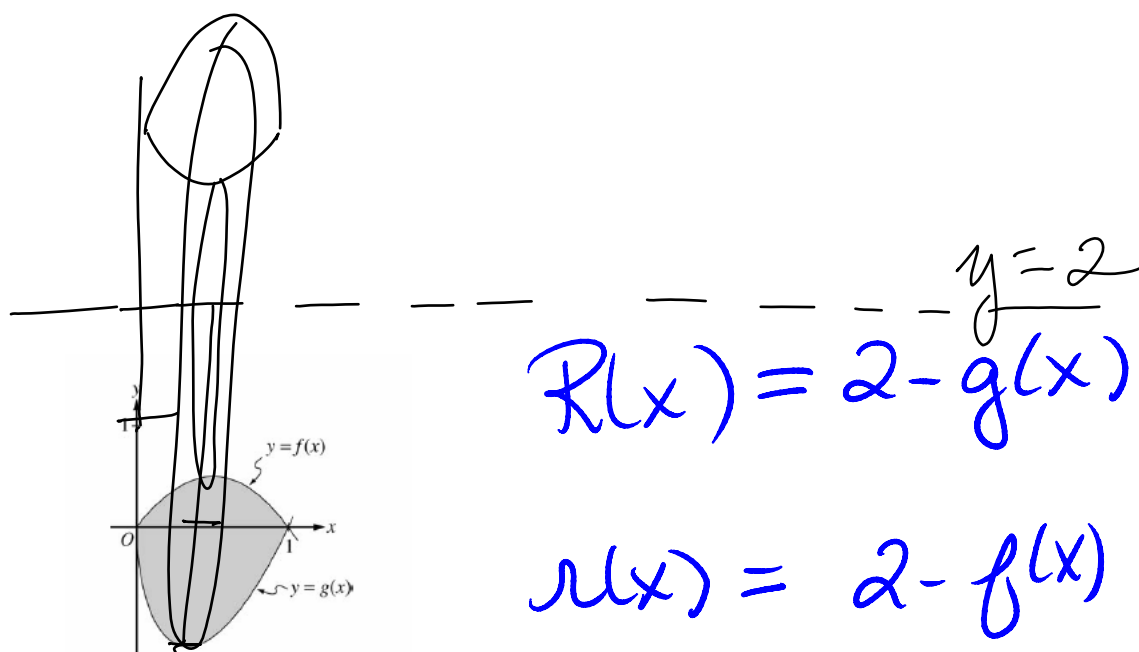
What is the general rule for finding the area between two curves?

$$\int_a^b [\text{TOP FUNCTION} - \text{BOTTOM FUNCTION}] dx$$

$$\text{Area}_{\text{sh}} = \int_0^1 [f(x) - g(x)] dx \approx 1.133 \text{ sq units}$$

(b) Find the volume of the solid generated when the shaded region enclosed by the graphs of f and g is revolved about the horizontal line $y = 2$

Let's draw a picture first!



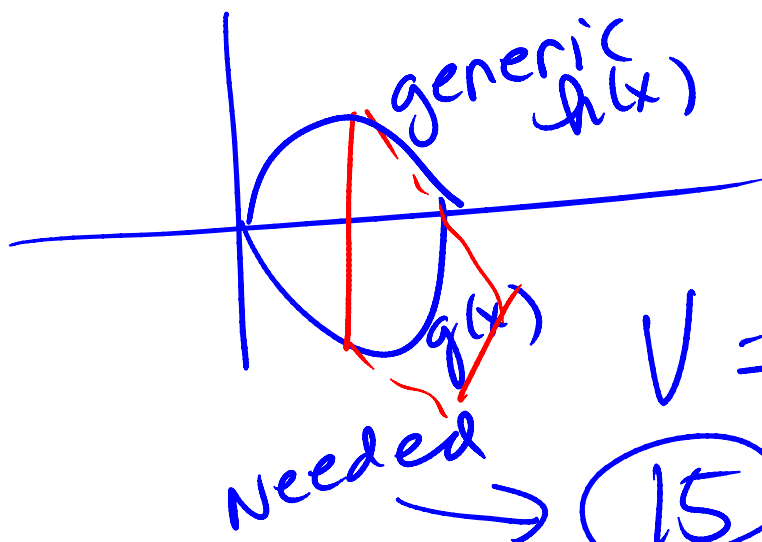
[Ms. McCleary's lame drawing is not to scale. You should be used to this by now!]

$$V = \pi \int_0^1 \left[(2-g(x))^2 - (2-f(x))^2 \right] dx \approx 5.150\pi \text{ CUBIC UNITS}$$

(c) Let h be the function given by $h(x) = kx(1-x)$ for $0 \leq x \leq 1$. For each $k > 0$, the region (not shown) enclosed by the graphs of h and g is the base of a solid with square cross sections perpendicular to the x -axis. There is a value of k for which the volume of this solid is equal to 15. Write, but do not solve, an equation involving an integral expression that could be used to find the value of k .

Think: Does $h(x)$ look like any other function that we know and love?

Looks like $f(x)$



$$A(x) = s^2$$

$$s = h(x) - g(x)$$

$$V = \int_0^1 [h(x) - g(x)]^2 dx$$

$$\text{needed} \rightarrow \textcircled{15} = \int_0^1 [h(x) - g(x)]^2 dx$$

Homework for tonight: 2008AB1 and 2006 AB1

These are calculator problems so please set up the problem using standard mathematical notation and then use your trust TI to find any numerical solutions. Don't forget that you only round at the final answer and that you will need to be accurate to the third decimal place.

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