**Section 5.3 Example 4.**

Determine the area of the region bounded by, \( y = x + 3, \ y = 3 - x, \ y = 2x \).

Sketch:

A: \( y = x + 3 \) \hspace{1cm} B: \( y = 2x \) \hspace{1cm} C: \( y = 3 - x \)

Notice we must divide the region into two pieces since the description for the height of a rectangle changes as we move the rectangle through the region.

i) Region on left: height is \( (x + 3) - (3 - x) = 2x \), width is \( dx \) so the area is \( \int_0^1 2x \, dx = 1 \).

ii) Region on right: height is given by \( (x + 3) - 2x = 3 - x \), width is \( dx \) so the area is given by \( \int_1^3 (3 - x) \, dx = 2 \).

So the total area is \( 1 + 2 = 3 \) square units.

Note: I got the limits by setting the equations equal to each other and solving. For example in the region on the left \( x + 3 = 3 - x \) which gives \( 2x = 0 \) so \( x = 0 \), the set \( 3 - x = 2x \) which gives \( x = 1 \). Finally, set \( 3 + x = 2x \) which gives \( x = 3 \).