Recitation # 2 Regions Between Curves

Group work:

Problem 1 *Consider the region bounded by the curves* $y = 2x^2 - 7x + 8$ *and* $y = x^2 - 4x + 18$.

(a) *Draw a sketch of the graphs.*

(b) *Find the area between these curves.*

(c) *Find the area of the region bounded by the curves* $x = 2y^2 - 7y + 8$ *and* $x = y^2 - 4y + 18$.

(d) *Find the area of the region bounded by the curves*

(i) $y = 2x^2 - 7x$ *and* $y = x^2 - 4x + 10$.

(ii) $y = 2x^2 - 7x - 30$ *and* $y = x^2 - 4x - 20$.

(e) *Find the area of the region bounded by the curves* $y = 2x^2 - 7x + 8$, $y = x^2 - 4x + 18$, $x = 1$, *and* $x = 6$.

Instructor Notes: Have the students do (a) and (b), and then have a group present. Afterwards, discuss the variations (c) and (d) as a whole class.

Problem 2 *Set up a single integral that computes the area of the region bounded by the curves (and be sure to draw a sketch of the graphs).*

(a) $x = y^2$ *and* $y = 6 - x$

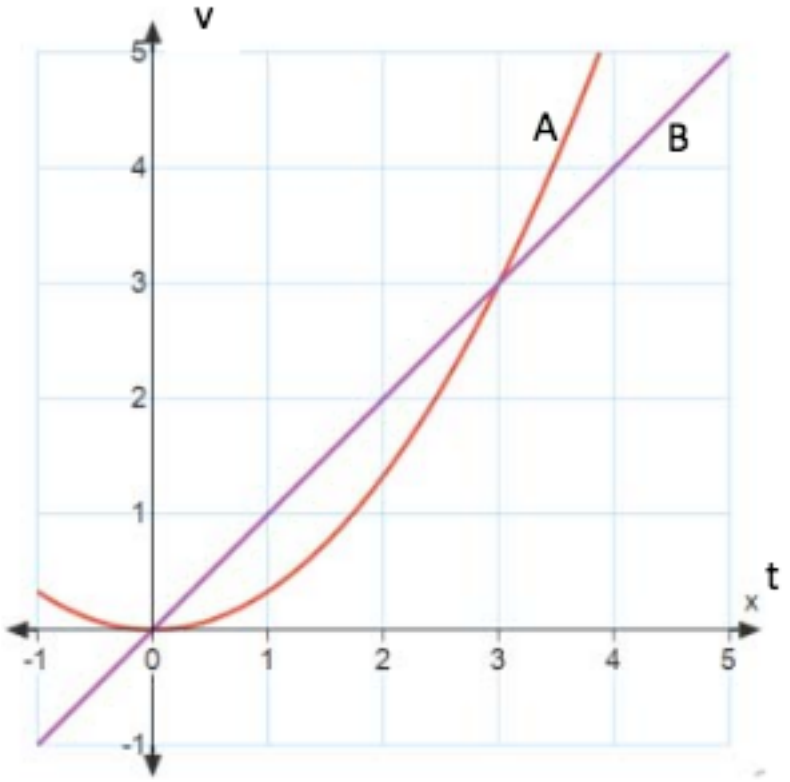
(b) $y = x^2 + 6$ *and* $y = 3x + 10$

Instructor Notes: Split (a) and (b) among the groups. Note that (a) should be set up in terms of y while (b) should be set up in terms of x. Have groups present their solutions. Discuss with the students factors to consider when deciding whether to integrate in terms of x or y.

Problem 3 *Two runners (A and B) run in a race in which the winner runs the farthest in 4 minutes. The runners' respective velocities are*

$$v_A(t) = \frac{1}{3}t^2 \qquad v_B(t) = t$$

The graphs of the runners' velocities is given below.



(a) *Who is running the fastest 2 minutes into the race?*

(b) *Who is winning the race 2 minutes into the race (and by how much)?*

(c) *What special event occurs 3 minutes into the race?*

(d) *Who wins the race (and by how much)?*

Instructor Notes: Do this problem as a class discussion. The main point is to have students identify how each of the questions relates to the graph of the velocity functions.