Name: _____ Date: _____

AP Calculus AB: Volumes of Known Cross Sections Ms. Loughran

Do Now:

1. Let $\int_0^x f(t)\,dt = x\sin\pi x$, find $f(3)$.

   (A) -3π (B) -1 (C) 0 (D) 1 (E) 3π

2. Find the volume of the region bounded by $y = 4x - x^2$ and the x-axis when revolved about the line $y = 6$.

A cross section is a slice-not necessarily a disk or a washer.

General solution:

This formula can be used for solids not obtained by revolution about a line. The only requirement is that each cross section perpendicular to the base of the solid must have a known area.

1. The base of solid S is the region enclosed by the graph of $y = \sqrt{9 - x^2}$ and the x-axis. If the cross sections of S perpendicular to the x-axis are squares, find the volume of S.

2. The base of a solid is the region in the first quadrant which is bounded by the line $4x + 5y = 20$ and the coordinate axes. What is the volume of the solid if every cross section perpendicular to the *x*-axis is a semicircle?

3. Find the volume of the solid whose base is bounded by the circle $x^2 + y^2 = 4$ with the indicated cross sections taken perpendicular to the *x*-axis:
   (a) squares
   (b) equilateral triangles
   (c) isosceles right triangles with hypotenuse in bounded region

Let’s find a general formula for finding the area of an equilateral triangle.