Name: _____ Section: _____

MA 114 — Calculus II *Spring 2015*

Quiz # 5 — 02/26/15

Answer all questions in a clear and concise manner. Answers that are without explanations or are poorly presented may not receive full credit.

1. Calculate the volume of the following solid. The base is a square, one of whose sides is the interval [0, w], along the x-axis. The cross sections perpendicular to the x-axis and at a distance x from the origin are rectangles of height x^3.

(a) Find the area of a cross section at distance x to the origin.

Since the base of the solid is a square, the length of one side of the rectangle is w and the height of the rectangle is x^3 so the area of a cross section perpendicular to the x-axis is

$A(x) = wx^3$

Award 1 point for the correct area.

(b) Calculate the volume V by integrating the cross-sectional area.

$$\begin{aligned} V &= \int_0^w wx^3 dx \\ &= \frac{wx^4}{4}\Big|_0^w \\ &= \frac{w(w)^4}{4} \\ &= \frac{w^5}{4} \end{aligned}$$

Award 1 point for setting up the correct integral, 1 point for the correct integration, and 1 point for the correct answer.