

Name: _____

Panther ID: _____

Worksheet week 7

Calculus II

Fall 2014

1. The region bounded between the graph of $\sin x$ and the x -axis when $x \in [0, \pi]$ is rotated around the y -axis; the solid formed has volume V_1 . Then the same region is rotated around the x -axis; the solid formed has volume V_2 . Find V_1 and V_2 and observe that $V_1 = 4V_2$.

2. Evaluate (a) $\int \sin^2 x \cos^3 x \, dx$

(b) $\int \tan^2 x \sec^4 x \, dx$

3. (a) Derive a reduction formula for

$$\int \sin^n x \, dx ,$$

where n is a positive integer. You may check formula (9) in 7.2 to confirm your result.

(b) Use part (a) to derive a recursion formula for

$$A_n = \int_0^{\pi/2} \sin^n x \, dx .$$

(c) Find A_1 directly, then find A_3, A_5 using the recursion formula. Write a general formula for A_n when n is odd.

(d) Find A_0 directly, then find A_2, A_4 using the recursion formula. Write a general formula for A_n when n is even.

The general formulas for A_n are the so-called *Wallis sine formulas*.