

# Math 12: Integration Project

## Due Wednesday November 4, 2009

### INTRODUCTION

With our understanding of integration and volume and surfaces for surfaces of revolution we are now prepared to apply this knowledge to real objects. In this project you will be computing the volume and surface area of an object that you find within the Mead art museum. The art museum has kindly agreed to aid us in working with the art and will be present to assist us. **Under no circumstances are you to touch any of the works at the museum.**

- **Thursday October 22** We will go meet in the Mead Art Museum at 1pm to obtain data for the objects. The museum has arranged for several staff members to take the actual measurements that you request. Remember that bags are not allowed in the museum and must be checked at the door, so allow ample time to get through this process. We will meet in the lobby of the museum.

### GOALS

- (1) Be able to compute the volume and surface area of an object that is symmetrical with respect to rotation.
- (2) Identify where these rotationally symmetric objects occur in everyday life.
- (3) Be able to clearly present a mathematical report.

### ASSIGNMENT

Find an object in Mead Art Museum that can be described as a curve rotated about an axis. Write a report consisting of the following.

- (1) A brief description/history of the object
- (2) The measurements taken at the museum (with diagram).
- (3) The equations that describes the curve.
- (4) The volume of the object.
- (5) The surface area of the object.

This report is to include all mathematical calculations that you perform.

**Rules for working with the art.** We will be hosted by the art museum staff during regular class time, where you will be assisted in learning about the art and obtaining data. **Under no circumstance are you to touch any of the works at the museum.** To prevent accidental damage, a good rule is to come no closer than 6" to any of the works. The staff will be glad to help you obtain your data. Be sure to bring a pencil as pens are not permitted in the museum.

**Checklist for Your Writing Projects.** Based on checklists by Annalisa Crannell at Franklin & Marshall and Tommy Ratliff at Wheaton College.

Does this paper:

- (1) clearly (re)state the problem to be solved?
- (2) provide an explanation as to how the problem will be approached?
- (3) state the answer in a few complete sentences which stand on their own?
- (4) give a precise and well-organized explanation of how the answer was found?

- (5) clearly label diagrams, tables, graphs, or other visual representations of the math?
- (6) define all variables, terminology, and notation used?
- (7) clearly state the assumptions which underlie the formulas and theorems, and explain how each formula or theorem is derived, or where it can be found?
- (8) give acknowledgment where it is due?
- (9) use correct spelling, grammar, and punctuation?
- (10) contain correct mathematics?
- (11) solve the questions that were originally asked?

#### GRADING

This project will be graded out of 25 points and will be graded on

- (1) Completion of all portions of assignment.
- (2) Correctness and clarity of mathematics and explanations.

#### HELPFUL SUGGESTIONS

- (1) Decide how to divide you object into separate curves *before* starting to measure.
- (2) Take more measurements than you think you actually need.
- (3) You may use a calculator or other device to solve the systems of equations.