

# COMPUTER PROJECT 4

## Double Integrals in Mathematica

DUE: 04/01/2026

Instructions: Use *Mathematica* to solve the following problems. You will need to email your notebook file to me at *byoung@wyomingseminary.org*. Use “Mathematica Project 4” as the subject line of your email.

### PART I

You have been given a region  $\mathcal{R}$  in the  $xy$ -plane and a function  $f = f(x, y)$  which is continuous over the given region. These data are different for each student and can be found after the instructions.

- a) Produce a plot of the region  $\mathcal{R}$ .
- b) Set up a *SINGLE* double integral for  $f$  over  $\mathcal{R}$ , and have *Mathematica* evaluate this integral for you.

### PART II

You have been given a region  $\mathcal{S}$  (described in polar coordinates) and a function  $g = g(x, y)$  which is continuous over the given region. These data are different for each student and can be found after the instructions.

- a) Produce a polar plot of the region  $\mathcal{S}$ .
- b) Set up a double integral for  $g$  over  $\mathcal{S}$  using polar coordinates, and have *Mathematica* evaluate this integral for you.

# Project 4 Data

Student	$\mathcal{R}$ for Part II	$f(x, y)$ for Part I	$\mathcal{S}$ for Part II	$g(x, y)$ for Part II
Yang Cao	$x \geq 0, y \geq 0,$ $y \leq x^2 + \frac{5x}{4},$ $y \leq 49 - 7x$	$9x^2y^5$	$0 \leq r \leq \cos(3\theta)$ $-\frac{\pi}{6} \leq \theta \leq \frac{\pi}{6}$	$3(x^2 + y^2) - 2xy$
Abigail Ryu	$x \geq 0, y \geq 0,$ $y \leq x^2 + \frac{3x}{2},$ $y \leq \frac{21}{2} - \frac{7x}{4}$	$4x^5y^4$	$0 \leq r \leq \sin(4\theta)$ $0 \leq \theta \leq \frac{\pi}{4}$	$10(x^2 + y^2) - 4xy$
Andrew Tsui	$x \geq 0, y \geq 0,$ $y \leq x^2 + \frac{4x}{5},$ $y \leq 174 - 29x$	$7x^3y^2$	$0 \leq r \leq \sin(3\theta)$ $0 \leq \theta \leq \frac{\pi}{3}$	$3(x^2 + y^2) - 4xy$
Theo Yang	$x \geq 0, y \geq 0,$ $y \leq x^2 + x,$ $y \leq 60 - 6x$	$4x^3y^5$	$0 \leq r \leq \cos(2\theta)$ $-\frac{\pi}{4} \leq \theta \leq \frac{\pi}{4}$	$2(x^2 + y^2) - 3xy$