

## EG02041 Advanced Mathematics

## Class 5: Functions of Several Variables &amp; First-Order Differential Equations

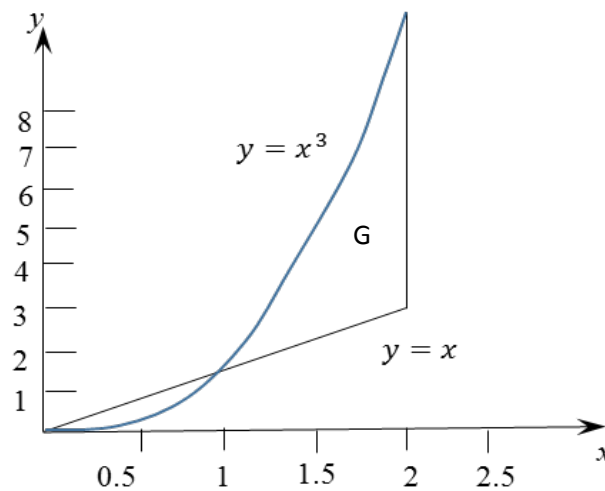
## Chapter 7: Functions of Several Variables

## 7.5 Multiple Integration

## Evaluation of Double Integrals:

1. **Exercise:** Evaluate  $\int_0^1 \int_{x^2}^x xy^2 dy dx$ .

2. **Exercise:** Find  $\iint_G \frac{1}{xy} dy dx$ , where the region  $G$  is shown in the figure below.



$$\int_1^2 \int_x^{x^3} \frac{1}{xy} dy dx = (\ln 2)^2$$

## Chapter 8: First-Order Differential Equations

### 8.1 Differential Equations and Initial-Value Problems

#### Initial-Value Problems:

3. **Exercise:** Solve  $y' = e^x + 5x - \sqrt{x}$ , given that,  $y(0) = 8$

4. **Exercise:** Solve  $f'' = x^2 - x$  given that  $f(1) = 0$  and  $f'(1) = -1$ .

#### **Verifying Solutions**

5. **Exercise:** Show that  $y = 4e^x + 5e^{3x}$  is a solution of  $y' - 4y'' + 3y = 0$ .