

American International University-Bangladesh

**Faculty of Science & Technology**

**Department of Mathematics**

**MAT1205: Integral Calculus and Ordinary Differential Equations (Sections: All)**

Final Examination

Total Marks: 40 Time: 2 Hours

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| **1.** |  | Answer the following. | **5** |
|  | **a.** | Evaluate . |  |
|  | **b.** | Evaluate , where is bounded by and Sketch the region . |  |
|  |  |  |  |
| **2.** |  | Answer the following. | **10** |
|  | **a.** | Evaluate by changing to polar coordinates, where is the region between the circles and . |  |
|  | **b.** | Evaluate by making an appropriate change of variables, where is the rectangle enclosed by the lines |  |
|  | **c.** | Find the mass and center of mass of the lamina with the density function that occupies the region . |  |
|  | **d.** | Use a triple integral to find the volume of a tetrahedron enclosed by the coordinate planes, and the plane . |  |
|  |  |  |  |
| **3.** |  | Answer the following. | **10** |
|  | **a.** | Using separation of variables, solve . |  |
|  | **b.** | Solve the system of ODEs: where and . |  |
|  | **c.** | Solve the given first order linear ODE: , where |  |
|  |  |  |  |
| **4.** |  | Solve the following. | **15** |
|  | **a.** |  |  |
|  | **b.** | **.** |  |
|  | **c.** | . |  |
|  | **d.** |  |  |
|  | **e.** | and , where . |  |