

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

**1.** Answer the following short questions(sample):

1. Evaluate ,
2. Form the double integral , where R is the region bounded by and .
3. The auxiliary roots of a differential equation is given as . Write down the

complementary function .

1. Find the auxiliary roots of the DE: .
2. Find for .
3. Find for .
4. Form the triple integral , .
5. Solve the DE: .
6. The solution of some DE is given as, which satisfies the initial condition . Find c.
7. Write down for the given DE: .

**2.**

1. Evaluate .
2. Evaluate .
3. Sketch the region bounded by and and evaluate .
4. Evaluate by changing to polar coordinates, where is the region enclosed by the circle with center the origin and radius 2.
5. Find the mass and center of mass of the lamina with the density function that occupies the region.
6. Use a triple integral to find the volume of a tetrahedron enclosed by the coordinate planes, and the plane .
7. Evaluate , where R is parallelogram bounded by the lines

**3.**

1. Using separation of variables, solve .
2. Solve the given first order linear differential equation: .
3. Solve +1.
4. Solve *,* where .
5. Solve .
6. Solve the following system of differential equations:

, .

1. Newton’s law of cooling states that the rate of change of temperature of a body is proportional to the difference between the temperature of the body and that of the surrounding medium. The room temperature is 700 F. When a cake is removed from an oven, its temperature is measured at F. Three minutes later its temperature is. How long will it take for the cake to cool off to a temperature of ?
2. If the population of a country doubles in 40 years, in how many years will it be four times under the assumption that the rate of increase is proportional to the present population.