

**Indian Institute of Technology Delhi**  
**Department of Physics**  
**Numerical Methods**  
Assisgment II

1. Suppose we have a vector  $\mathbf{v} = (2xz + 3y^2)\hat{j} + 4yz^2\hat{k}$ . Check the Stokes theorem

$$\iint (\nabla \times \mathbf{v}) \cdot d\mathbf{a} = \oint \mathbf{v} \cdot d\mathbf{l}$$

using Simpsons method by assuming  $h = 10^{-4}$  for the surface between  $(0, 0, 0)(0, 1, 1)$ . (See Introduction to Electrodynamics 3<sup>rd</sup> edition David J Griffith Example 1.11)

2. Suppose a body of mass  $m$  is traveling vertically upward starting at the surface of the earth. If all resistance except gravity is neglected, the escape velocity  $v$  is given by

$$v^2 = 2gR \int_1^\infty z^{-2} dz$$

and  $R = 3960$  miles is the radius of the earth, and  $g = 0.00609 \text{ mi/s}^2$  is the force of gravity at the surface. Approximate the escape velocity by assuming  $h = 10^{-3}$ ?