

MULTIVARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS (MTH-201)

SURPRISE QUIZ-2, (16/11/2016)

Time: 45 minutes

Maximum Marks: 10

Marks for each questions are given right side.

Problem 1. Let $X = [-1, 0] \cup \{1/n : n > 0, n \in \mathbb{Z}\}$ be a subset of \mathbb{R} . Find $\text{Int}(X)$, $\text{Ext}(X)$, $\text{Bd}(X)$. Justify your answer by definition. (3)

Problem 2. Show that the union and intersection of two open sets in \mathbb{R} is also an open set. (3)

Problem 3. Let S be the surface obtained by rotating the curve

$$x = \cos t, z = \sin 2t, -\frac{\pi}{2} \leq t \leq \frac{\pi}{2}$$

around the z -axis. Find the volume of the region inside of S . (4)

Hint: Define a vector field \mathbf{F} such that $\text{div}\mathbf{F} = 1$ and then apply the divergence theorem. You can do it by other methods also.