College of Basic Education Midterm Exam Subject: Mathematical Analysis

Department of Mathematics Time: 90 Min.

3rd Stage

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**Q1/** Let $X=R^{2}$, define $d:X×X\rightarrow R$ be a function defined by $d\left(x,y\right)=\left|x\_{1}-y\_{1}\right|+\left|x\_{2}-y\_{2}\right|$, where $x=\left(x\_{1},x\_{2}\right)and y=(y\_{1},y\_{2}) $then

1. Show that (X,d) is a metric space.
2. Find $B\_{1}(\left(0,0\right))$, and sketch the graph of $B\_{1}(\left(0,0\right))$. (8+4) marks

**Q2/** State and prove Cauchy Schwartz inequality. 6 marks

**Q3/** Prove or disprove the following: -

1. In (R,U), $A=Z$ is closed set.
2. Intersection of infinite collection of open sets is also open set. (6+6) marks

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