King Abdul Aziz University **Math 463 FAR** **Second Semester 1433/ 1434**

Faculty of Science **General Topology** **Date: 8 /7 /1434**

Mathematics Departement **Final Exam** **Time:8- 10**

Name: **Co. No.** **Serial number**

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Answer the following:

(QI) Mark true or false and justify your answer.

1. Let (X,τ) be a topological space and $A \subset X$. Then $A^c \subset ext(A)$. 0.5

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2. $x \in A'$ iff $x \in \overline{A - \{x\}}$ 1.5

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3. Let A be any subset of a topological space X, then $b(A) = \varphi$ if and only if A is both open and closed. 2

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4. Every finite T_1 –space X is a discrete space. 1.5

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5. If $A \subset B$, then $\overline{B} \subset \overline{A}$. 1.5

6. The identity map $i : (X, \tau_1) \to (X, \tau_2)$ is continuous if and only if $\tau_1 \subset \tau_2$. 2

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7. The discrete space X is separable if and only if it is countable. 2

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8. Let A be a nonempty set of a metric space X. Then $x \in A$ iff $d(x, A) = 0$. 2

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9. Any subspace of a second countable space is second countable. 2

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10. Every indiscrete space is disconnected. 1

(QII) Prove the following:

1. Let $f: X \to Y$ be a function from the topological space (X, τ_X) into the topological space (Y, τ_Y). Prove the following are equivallent: 3

a. for each closed set B in $Y, f^{-1}(B)$ is closed in X,

b. for each subset $B \subset Y, \overline{f^{-1}(B)} \subset f^{-1}(\overline{B})$

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2. Every compact Hausdorff space is normal. 5

3. Let C be a connected subset of the space X. Then

a. every set B such that $C \subset B \subset \overline{C}$ is also connected, [3]

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b. $\overline{B}$ is connected [1]

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4. Let (X, d) be a metric space. Then the set of all open balls in X is a base for a topology on X. [4]

5. Compactness is a topological property. 4

6. Let A be a closed subset of a T_4 –space. Show that A with the relative topology is also T_4 –space. 4