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| Time: 2 hours | ريض 5411 | King Saud University |
| 3/3 /2020 | Med Term Exam | Second Term |

Student Name:………………………………….

Q1**:** Let be an module and let be any nonempty collection of submodules of . Show that:

(a) is a submodule of.

(b) If is a finite family of submodules of then

,

where



Q2:

1. State and prove the 2ndIsomorphism Theorem.
2. Let be a ring and let be a cyclic module. Show that

.

Q3: If are three -modules , and are two -module homeomorphisms . Show that:

**i)** If is an integral domain then .

**ii)**.

**iii)** If is exact sequence the the following sequence is

exact:*.*

Where are the restriction of and on and

) respectively.

Q4: If be an module homomorphism such that ,

Show that.

1. Using part A to prove that If M is simple (irreducible) then f is either zero or isomorphism.
2. Let be two R-modules, show that the sequence:

is exact, whereand are

the canonical injective and projective respectively.

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