AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES – AIMS

Course Name: Assignment Number

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1   ADJOINT OPERATORS – SHEET ONE, QUESTION 4

Consider a finite-dimensional vector space V equipped with an inner product $(\cdot, \cdot)$. Suppose A and B are operators in V. Show the following identities

(a) $(A^\dagger)^\dagger = A$.

(b) $(AB)^\dagger = B^\dagger A^\dagger$.

(c) If A and B are both Hermitian operators then the commutator $C = [A, B]$ is anti-Hermitian i.e. $C^\dagger = -C$.

1.1   SOLUTION – ADJOINT OPERATORS: SHEET ONE, QUESTION 4

Write your solution here

2   PROJECTION OPERATORS – SHEET ONE, QUESTION 5

Type the question here

2.1   SOLUTION – PROJECTION OPERATORS: SHEET ONE, QUESTION 5

Write your solution here

3 Measurements and expectation values – Sheet two, Question 1

Type the question here

3.1 Solution – Projection operators: Sheet two, Question 1

Write your solution here

4 Subspaces of a vector space – Sheet two, Question 3

Type the question here

4.1 Solution – Subspaces of a vector space: Sheet two, Question 3

Write your solution here

Below is the python program used to solve the problem.

```python
# Author: Firstname Middlename LASTNAME
# Email: username@aims.ac.za
# Comment:

#================Modules====================

#================Constants==================

#================Functions==================

def applyToEach(L, x):
    """
    L = list of functions
    x = int or floating point number
    """
    result = []
    for func in L:
        result.append(func(x))
    return result

def square(x):
    """
    x = int or floating point digit
    """
    return x * x

#================Implementation=============
```

```
if __name__ == "__main__":
    print applyToEach([square, abs], -4)
```