***Solution Section* 3.1 – Inner Products**

***Exercise***

Let  be the Euclidean inner product on , and let , , , and . Compute the following.

1. 
2. 
3. 
4. 
5. 
6. 

***Solution***

1. 



1. 





1. 





1. 





1. 







1. 







***Exercise***

Let  be the Euclidean inner product on , and let , , and . Compute the following for the weighted Euclidean inner product  .

1. 
2. 
3. 
4. 
5. 
6. 

***Solution***

1. 



1. 



1. 





1. 





1. 







1. 







***Exercise***

Let  be the Euclidean inner product on , and let , , , and . Verify the following.

|  |  |
| --- | --- |
|  |  |

***Solution***

1. 







 ***√***

1. 









 ***√***

1. 









 ***√***

1. 







 ***√***

1. 







 ***√***

***Exercise***

Let  be the Euclidean inner product on , and let , , , and . Verify the following for the weighted Euclidean inner product  .

|  |  |
| --- | --- |
|  |  |

***Solution***

1. 







 ***√***

1. 









 ***√***

1. 









 ***√***

1. 







 ***√***

1. 







 ***√***

***Exercise***

Let  and . Show that the following are inner product on  by verifying that the inner product axioms hold. 

***Solution***

*Axiom* 1: 



 ***√***

*Axiom* 2: 







 ***√***

*Axiom* 3: 



 ***√***

*Axiom* 4: 



 ***√***

***Exercise***

Show that the following identity holds for the vectors in any inner product space



***Solution***









  ***√***

***Exercise***

Show that the following identity holds for the vectors in any inner product space



***Solution***







  ***√***

***Exercise***

Prove that 

***Solution***







 ***√***