The Inner Product problems

Coding the Matrix, 2015

`For auto-graded problems, edit the file The_Inner_Product_problems.py to include your solution.`

Problem 1: For each of the following problem, compute the norm of given vector $\boldsymbol{v}$:

(a) $\boldsymbol{v} = [2, 2, 1]$

(b) $\boldsymbol{v} = [\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}]$

(c) $\boldsymbol{v} = [1, 1, 1, 1, 1, 1, 1, 1, 1]$

Problem 2: For each of the following $\boldsymbol{a}, \boldsymbol{b}$, find the vector in Span $\{\boldsymbol{a}\}$ that is closest to $\boldsymbol{b}$:

1. $\boldsymbol{a} = [1, 2], \boldsymbol{b} = [2, 3]$
2. $\boldsymbol{a} = [0, 1, 0], \boldsymbol{b} = [1.414, 1, 1.732]$
3. $\boldsymbol{a} = [-3, -2, -1, 4], \boldsymbol{b} = [7, 2, 5, 0]$

Projection Orthogonal to $\boldsymbol{a}$ and along $\boldsymbol{a}$

Problem 3: For each of the following $\boldsymbol{a}, \boldsymbol{b}$, find $\boldsymbol{b}^{\perp \boldsymbol{a}}$ and $\boldsymbol{b}^{||\boldsymbol{a}}$.

1. $\boldsymbol{a} = [3, 0], \boldsymbol{b} = [2, 1]$
2. $\boldsymbol{a} = [1, 2, -1], \boldsymbol{b} = [1, 1, 4]$
3. $\boldsymbol{a} = [3, 3, 12], \boldsymbol{b} = [1, 1, 4]$