In [1]:
```
import numpy as np
from scipy import linalg as la
```

Initializing variables

In [2]:
```
matrix_a = np.array([[0, 3, -1],
                     [-1, 4, -2],
                     [1, 3, 1]])
matrix_b = np.array([[2, -1, 2],
                     [-1, 0, 1],
                     [-1, 2, 2]])

vector_v = np.array([2, -1, 4])
vector_u = np.array([-2, 1, 5])

scalar_a = -2
scalar_b = 1
```

Question 1

In [3]:
```
# Calculating ‖v‖1v + au
```

In [4]:
```
result = la.norm(vector_v, 1) * vector_v + scalar_a * vector_u
print('Result = ', result)
```

```
Result =  [18. -9. 18.]
```

Question 2

In [5]:
```
# Calculating the cos_theta between u and v
```

In [6]:
```
cosine_thetha = (vector_u.dot(vector_v)) / (la.norm(vector_u, 2) * la.norm(vector_v, 2
print('Cosine of Theta between vector u and vector v = ', round(cosine_thetha, 4))
```

```
Cosine of Theta between vector u and vector v =  0.5976
```

Question 3

In [7]:
```
# Calculating a(A·v)
```

In [8]:
```
result = scalar_a * (matrix_a.dot(vector_v))
print('Result = ', result)
```

```
Result =  [14 28 -6]
```

Question 4

In [9]:
```
# Calculating A·BT + tr(B) * L
```

In [10]:
```
matrix_b_transpose = matrix_b.T
trace_of_matrix_b = matrix_b.trace()
lower_triangular_b = la.tril(matrix_b)
```

```
result = matrix_a.dot(matrix_b_transpose) + trace_of_matrix_b * lower_triangular_b
print('Result = \n', result)
```

```
Result =
 [[  3  -1   4]
 [-14  -1   5]
 [ -3   8  15]]
```

In [ ]: