Group A.

Ex. 1 Write an example of:

a) an upper triangular matrix 4×4. *(0.5 points)*

b) an identity matrix 5×5. *(0.5 points)*

Ex. 2 Find the area of the region between the curve $y = (x-2)^2$ and the lines $y = 0,\ y = x$. *(3 points)*

Ex. 3 Write one application of the definite integral different than in Exercise 2. *(1 point)*

Ex. 4 Compute $(\frac{1-\sqrt{3}i}{2})^{18}$ and write the answer in standard form. *(3 points)*

Ex. 5 Find $\sqrt[3]{27i}$. Write the roots in standard form and plot the roots on the complex plane. *(4 points)*

Ex. 6 Let:

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -1 & 5 \\ -2 & 1 & 4 \end{bmatrix},\ B = \begin{bmatrix} 1 & 2 \\ -1 & -1 \\ 0 & 5 \end{bmatrix},\ C = \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 0 & -2 \end{bmatrix},\ D = \begin{bmatrix} 2 \\ -5 \end{bmatrix}.$$

Find: (a) $A^T \cdot B$ *(1 point)*, (b) $A \cdot (2B - C)$ *(1 point)*, (c) $C \cdot D$ *(1 point)*.

Group B.

Ex. 1 Write an example of:

a) a lower triangular matrix 5×5. *(0.5 points)*

b) an identity matrix 4×4. *(0.5 points)*

Ex. 2 Find the area of the region between the curve $y = x^2$ and the lines $y = 0,\ y = 2 - x$. *(3 points)*

Ex. 3 Write one application of the definite integral different than in Exercise 2. *(1 point)*

Ex. 4 Compute $(\frac{-\sqrt{2}-\sqrt{2}i}{2})^{24}$ and write the answer in standard form. *(3 points)*

Ex. 5 Find $\sqrt[3]{-4}$. Write the roots in standard form and plot the roots on the complex plane. *(4 points)*

Ex. 6 Let:

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \\ -1 & 1 \end{bmatrix},\ B = \begin{bmatrix} 1 & -2 \\ -5 & 0 \\ 1 & 1 \end{bmatrix},\ C = \begin{bmatrix} 2 \\ 0 \end{bmatrix},\ D = \begin{bmatrix} 1 & 5 & 0 & -6 \end{bmatrix}.$$

Find: (a) $A \cdot B^T$ *(1 point)*, (b) $(2A + B) \cdot C$ *(1 point)*, (c) $C \cdot D$ *(1 point)*.

Group C.

Ex. 1 Write an example of:

a) a diagonal matrix 5×5. *(0.5 points)*

b) an identity matrix 4×4. *(0.5 points)*

Ex. 2 Find the area of the region between the curve $y = x^2$ and the lines $y = 0,\ y = 2 - x$. *(3 points)*

Ex. 3 Write one application of the definite integral different than in Exercise 2. *(1 point)*

Ex. 4 Compute $(\frac{1-\sqrt{3}i}{2})^{21}$ and write the answer in standard form. *(3 points)*

Ex. 5 Find $\sqrt[3]{-2i}$. Write the roots in standard form and plot the roots on the complex plane. *(4 points)*

Ex. 6 Let:

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 3 & -5 \\ 0 & 1 & 4 \end{bmatrix},\ B = \begin{bmatrix} -1 & 2 & -1 \\ 3 & 0 & 1 \\ 1 & -2 & 0 \end{bmatrix},\ C = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix},\ D = \begin{bmatrix} 3 & -1 \\ -2 & -5 \\ 0 & 1 \end{bmatrix}.$$

Find: (a) $A \cdot B^T$ *(1 point)*, (b) $(B - A) \cdot C^T$ *(1 point)*, (c) $C \cdot D$ *(1 point)*.