Mathematics Review Course
Summer 2023
Problem Set 06

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Note: [Source] at the start of each problem denotes the source of the question. If there is no source, it is an original problem of my creation.

Dot Products

1. Find $u \cdot v$ given $u = (4, 5, -6)$ and $v = (0, -2, -3)$.
2. Find $a \cdot b$ given $a = (6, -1, 3)$ and $b = (4, 18, -2)$.

Cross Products

3. Cross product of $u = (2, 0, 0) \times v = (2, 2, 0)$.
4. Cross product of $u \times v$ given $u = 2\vec{i} + 3\vec{j}$ and $v = \vec{j} + 2\vec{k}$.

Matrix Multiplication

5. Find the matrix AB given $A = \begin{bmatrix} 1 & 2 \\ 0 & 4 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 & 8 & 1 \\ 5 & 3 & -9 & 0 \end{bmatrix}$.
6. Find the vector $(a - 2b) \times c$ given $a = \begin{vmatrix} i & j & k \\ 2 & -1 & 5 \\ 0 & 1 & 8 \end{vmatrix}$ and $b = \begin{vmatrix} i & j & k \\ 0 & 1 & 1 \\ 2 & -1 & -2 \end{vmatrix}$ and $c = i + j + k$.

Determinants

7. $det \begin{pmatrix} 2 & 3 & 1 \\ -1 & 2 & 3 \\ 3 & 2 & -1 \end{pmatrix}$.
8. $det \begin{pmatrix} 15 & 4 & 8 \\ -12 & -7 & 5 \\ 0 & -5 & 15 \end{pmatrix}$.