Problem 1. Let \( \mathbf{u} = \langle 2, 3, 6 \rangle \). Find the values of \( \lambda \) such that \( |\lambda \mathbf{u}| = 5 \).

Problem 2. Let \( \mathbf{u}, \mathbf{v} \), two vectors such that \( |\mathbf{u}| = 2 \), \( |\mathbf{v}| = 5 \), and \( \mathbf{u} \cdot \mathbf{v} = -2 \). Determine the value of \( |\mathbf{u} + 3\mathbf{v}| \).

Problem 3. One of the applications of the dot-product operations is the computation of work. If a constant force \( \mathbf{F} \) moving an object through a displacement \( \mathbf{D} = \overrightarrow{PQ} \) has some other direction, the work performed by the component of \( \mathbf{F} \) in the direction of \( \mathbf{D} \) is

\[
W = \mathbf{F} \cdot \mathbf{D}
\]

How much work does it take to slide a crate 20 [m] along a loading dock by pulling on it with a 200 [N] force at an angle of 30° from the horizontal?

Answers.
1. \( \pm \frac{5}{7} \).
2. \( \sqrt{217} \).
3. 3464 [J]