Read each question carefully and be sure to SHOW ALL WORK. Correct answer without proper justification will not receive a "Complete" grade. Paç fat! Good luck!

Name: _____

LO 2. Dot and Cross Products. I can calculate and interpret the dot and cross products in various contexts.

Criteria for Success: I can

- calculate the dot product of two vectors given by various representations both geometrically and symbolically
- use the dot product to solve various application questions such as finding the angle between two vectors, the projection of one onto the other, and work
- calculate the cross product of two vectors given by various representations both geometrically and symbolically
- use the cross product to solve various application questions such as finding a vector perpendicular to two given vectors, finding the area of the parallelogram determined by two vectors in 3 dimensions, and torque

Question: The resultant force $\vec{F}$ of magnitude 13 Newtons in the direction 22.62 degrees clockwise from North direction (positive y-axis) is being applied to a boat on the ocean.

(a) Draw $\vec{F}$ on the coordinate grid, and write it in standard form (i.e., in coordinates). Round coordinates to nearest whole number.

(b) Let $\vec{a}$ be the unit vector in the direction of the vector $\langle 4, 3\rangle$. Write $\vec{a}$ in standard form, find a unit vector $\vec{b}$ perpendicular to it closer to the North direction, and draw them in the above coordinate grid of vector $\vec{F}$. Alternatively, you could think of $\vec{b}$ as $\vec{a}$ rotated by 90 degrees either counterclockwise.

(c) The resultant force $\vec{F}$ was created as a result of forces $\vec{F_1}$ and $\vec{F_2}$ applied to the boat in the directions of $\vec{a}$ and $\vec{b}$ respectively. Find the standard form of $\vec{F_1}$ and $\vec{F_2}$, as well as their magnitudes.