MT-A141 Precalculus Worksheet 8.3

Group: _____ Present: _____

1. Compute the following for the vectors $\underline{u} = \langle -3, 4 \rangle$ and $\underline{v} = \langle -2, 3 \rangle$.

(a) $3\underline{u} - 5\underline{v}$

(b) $||u||$

(c) The direction angle for $\underline{v}$

(d) A unit vector $\underline{w}$ in the same direction as $\underline{u}$.

2. Write the vector which has length 7 and direction 115° in terms of its horizontal and vertical components (that is, as a linear combination of the standard unit vectors $\underline{i}$ and $\underline{j}$).

3. Navigation. Suppose an aircraft has a cruising speed (relative to air) of 500 miles per hour, and that the wind speed at cruising altitude is 150 miles per hour directly FROM the West.

(a) If the plane has bearing 35° (that's the direction the pilot points the plane), in what direction and at what speed will the plane actually go (relative to the ground)? Follow these steps:

Write the velocity vector $\underline{u}$ for the plane (relative to the air) in terms of $\underline{i}$ and $\underline{j}$ (Remember to convert between navigational bearings and angles measured mathematically):

Write the velocity vector $\underline{w}$ for the wind (relative to the ground) in terms of $\underline{i}$ and $\underline{j}$:

Find the velocity vector $\underline{v}$ for the plane relative to the ground:

Answer the initial question by finding the length and direction of the vector $\underline{v}$.

(b) Think about how you would solve the real navigation problem: finding the direction to point the plane so that the aircraft actually flies to its destination!