Pre-Calculus

Name: \_\_\_\_\_

## **Vector Word Problems**

A DC-10 jumbo jet maintains an airspeed of 550 miles per hour in a southwesterly direction. The velocity of the jet stream is a constant 80 miles per hour from the west. Find the actual speed and direction of the aircraft.

- 1) What angle is the jet flying from standard position?
- 2) Write the vector that represents the magnitude and direction of the jet. Leave your numbers in exact form. Remember to use the equation :  $v = ||v||(\cos \theta i + \sin \theta j)!$
- 3) What is the angle of the wind from standard position?
- 4) Write the vector that represents the magnitude and direction of the wind. Leave your numbers in exact form.
- 5) Find the vector that represents the magnitude and direction of the jet and the wind combined.
- 6) Find the speed of the jet and the wind combined; this is the actual speed. (Remember: speed is magnitude!) Round to 3 decimal places.
- 7) Find the direction of the jet and the wind combined; this is the actual direction the aircraft will be. Draw a picture of your angles from #1 and #3 to give you a context for whether you can use the answer the calculator gives you or if you need to find an alternate answer. Round your angle to 3 decimal places.
- 8) What direction is the jet actually flying?
- 9) Write the actual speed and direction in a complete sentence.

10) An airplane has an airspeed of 500 kilometers per hour bearing  $N45^{\circ}E$ . The wind velocity is 60 kilometers per hour in the direction  $N30^{\circ}W$ . Find the resultant vector representing the path of the plane relative to the ground. What is the ground speed of the plane? What is its direction?

11) An airplane has an airspeed of 600 kilometers per hour bearing  $S30^{\circ}E$ . The wind velocity is 40 kilometers per hour in the direction  $S45^{\circ}E$ . Find the resultant vector representing the path of the plane relative to the ground. What is the ground speed of the plane? What is its direction?