Beverly Hills High School -- AP Physics C -- Fall 2016 -- Vectors Quest -- 50 points

Show all your work neatly and completely; if it isn't clear, you don't score. Be sure to add all units where required. Circle your answers or state conclusions clearly; don't make the examiner search for them. Ten points each.

1) Calculate the angle between the two vectors given by $\vec{a} = 4\hat{i} - 3\hat{j} + 2\hat{k}$ and $\vec{b} = -2\hat{i} + 5\hat{j} + 3\hat{k}$

2) Determine the result of this two-space vector operation: $-3\vec{a} + 4\vec{b} - \frac{1}{2}\vec{c}$ if $\vec{a} = 6\hat{i} + 7\hat{j}$,

$\vec{b} = 12.5\hat{i} + 8\hat{j}$, and $\vec{c} = -36\hat{i} + 14\hat{j}$

3) Chuy drives his powder blue 1964 Impala, you know, the chort with the tuck-and-roll interior, grey lights in the wheel wells, and twice pipes, and says Crystal Blue Persuasion on the rear glass...yeah, that one... anyway, he leaves home and drives 18.3 miles at 23° to his novia's casa (his girlfriend's house), then turns left 90° and drives 11.8 miles to his favorite cucina, Rigoberto's Burritos Rojos. What is his vector displacement from home?

4) Given $\vec{R_1} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{R_2} = 4\hat{i} - 5\hat{j} + \hat{k}$, find $\vec{R_1} \times \vec{R_2}$.

5) Let each box in each graph represent one meter. Add the two vectors analytically and graphically in the third graph below. Be neat and use a ruler.