**Mth 254 Project Two, Due Monday, January 28th, in class.**

(1) An airplane travels 400 mph in still air. The plane takes off and heads due north. One hour later, the plane is 240 miles from its starting point in a direction 30° west of north.

    (a) What is the wind speed and direction?

    (b) In what direction should the plane have headed to end up directly north of the starting point? How far from its starting point would the plane be in one hour if it had headed in that direction?
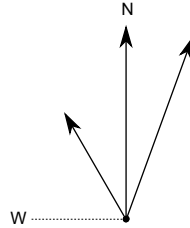
(2) An ellipse of the form $A^2 x^2 + B^2 y^2 = R^2$ can be given in parametric form by:

$$r(t) = \left\langle \frac{R}{A} \cdot \cos(t), \frac{R}{B} \cdot \sin(t) \right\rangle.$$

    Consider the surface $x^2 + 4 \cdot y^2 + z^2 = 12$

    (a) Parameterize the curve of intersection of this surface with the plane $x = 2$
        Your answer should be of the form $r(t) = \langle 2, \text{----} , \text{----} \rangle$

    (b) Parameterize the curve of intersection of this surface with the plane $y = 1$

    (c) Find unit tangent vectors to the two curves from parts (a) and (b) at the point $(2, 1, 2)$