

Winter 1998

Show all work for credit. Do all your work neatly on the paper provided. Write your name on each sheet you turn in. I will **not** grade any work done on the test sheet. When you are finished turn in all sheets including the test. Good Luck.

1. Use the given information to solve (if possible) the triangle. If two solutions exist find both.
 - (a) $A = 20.5^\circ$, $a = 12$, $b = 31$
 - (b) $A = 58^\circ$, $a = 4.5$, $b = 12.8$
 - (c) $a = 6$, $b = 8$, $c = 12$
 - (d) $A = 120^\circ$, $b = 3$, $c = 10$

2. Because of prevailing winds, a tree grew so it was leaning 6° from vertical. At a point 30 meters from the tree, the angle of elevation to the top of the tree is 20.83° (see picture on board). Find the height of the tree.

3. Given the vectors $\mathbf{u} = \langle 1, 2 \rangle$ and $\mathbf{v} = \langle -1, 5 \rangle$ do the following:
 - (a) Find $2\mathbf{u} - 3\mathbf{v}$.
 - (b) Find $\|\mathbf{u}\|$.
 - (c) Find the direction angle of \mathbf{v} .
 - (d) Find a vector \mathbf{w} with $\|\mathbf{w}\| = 2$ in the same direction as \mathbf{u} .
 - (e) Sketch a graph of the vectors \mathbf{u} and \mathbf{v} .

4. Given the vectors $\mathbf{u} = 4\mathbf{i} + 2\mathbf{j}$ and $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j}$ do the following.
 - (a) Find $\mathbf{u} \cdot \mathbf{v}$.
 - (b) Find The angle between \mathbf{u} and \mathbf{v} .
 - (c) Determine if the vectors \mathbf{u} and \mathbf{v} are orthogonal, parallel, or neither.
 - (d) Find a non-zero vector which is orthogonal to \mathbf{u} .
 - (e) Find a non-zero vector which is parallel to \mathbf{v} .
 - (f) Find the projection of \mathbf{u} onto \mathbf{v} (what we called \mathbf{w}_1), and the vector component of \mathbf{u} orthogonal to \mathbf{v} (what we called \mathbf{w}_2).