

12 Calculus and Vectors
Vectors Assignment #2

1. Two vectors $2\vec{a} + \vec{b}$ and $\vec{a} - 3\vec{b}$ are perpendicular. Find the angle between \vec{a} and \vec{b} , if $|\vec{a}| = 2|\vec{b}|$.

2. A force of 60 N acts at the end of a wrench 20 cm long.
 - a) In what direction should the force act to produce the maximum torque? (Draw a diagram.)
 - b) What is the maximum torque?
 - c) At what angle will the force produce half the maximum torque? Indicate the angle on your diagram.

3. Find the volume of a parallelepiped determined by the vectors $\vec{a} = [2, -5, -1]$, $\vec{b} = [4, 0, 1]$, $\vec{c} = [3, -1, -1]$

4. If the cross product of \vec{a} and \vec{b} is equal to the cross product of \vec{a} and \vec{c} , this does not necessarily mean that \vec{b} equals \vec{c} . Show why this is so
 - a) by making an algebraic argument.
 - b) by making a geometric argument. (a diagram)