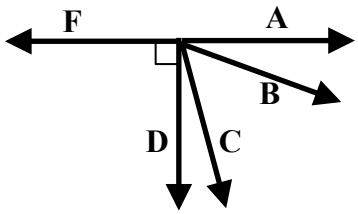
Vector Multiplication:
The Dot Product & The Cross Product

PHYSICS 204, MAX S. BEAN
JOHN JAY COLLEGE OF CRIMINAL JUSTICE, THE CUNY

The problems below refer to the following vectors, all of which have equal magnitudes:



1. Put the following dot-products in order from greatest to smallest. Please give some explanation of your reasoning:

   a. $\vec{A}\cdot\vec{B}$ b. $\vec{A}\cdot\vec{C}$ c. $\vec{B}\cdot\vec{C}$ d. $\vec{A}\cdot\vec{D}$

2. Put the following cross-products in order from greatest to smallest magnitude. Please give some explanation of your reasoning:

   a. $\vec{A}\times\vec{B}$ b. $\vec{A}\times\vec{C}$ c. $\vec{A}\times\vec{D}$ d. $\vec{A}\times\vec{F}$

3. Assuming that all the vectors have magnitude 3, find the following (if the result is a vector, indicate the direction):

   a. $\vec{A}\cdot\vec{F}$ b. $\vec{A}\cdot\vec{D}$ c. $\vec{A}\times\vec{F}$ d. $\vec{A}\times\vec{D}$ e. $\vec{F}\times\vec{D}$

   f. $\vec{C}\cdot\vec{C}$ g. $\vec{C}\times\vec{C}$

4. Assuming that $\vec{A}$ and $\vec{B}$ are separated by an angle of $30°$, and $\vec{A}$ and $\vec{C}$ are separated by an angle of $75°$, find the following (if the result is a vector, indicate direction):

   a. $\vec{A}\cdot\vec{B}$ b. $\vec{A}\cdot\vec{C}$ c. $\vec{B}\cdot\vec{C}$

   d. $\vec{A}\times\vec{B}$ e. $\vec{B}\times\vec{A}$ f. $\vec{B}\times\vec{C}$

   b. $\vec{A}\cdot\hat{C}$ b. $\hat{D}\cdot\hat{C}$ c. $\hat{F}\times\vec{C}$