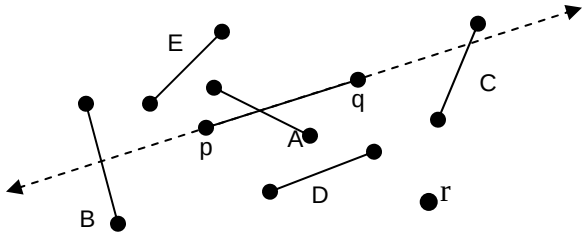
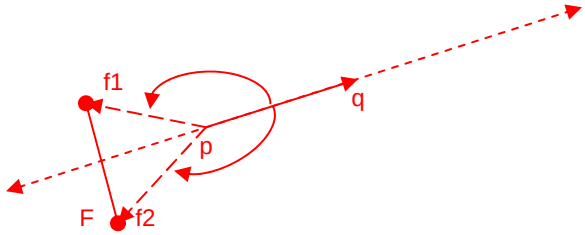
CS 410/586: Quiz 8, 24 May 2011 Name:___KEY_____

No books or notes. Work individually.



Question 8A (5 points): Describe a method to decide if a line segment S crosses the infinite ***line*** defined by two points p and q. In the figure above, segments A, B and C cross the p—q line. (You can assume that no three endpoints involved are co-linear.) Try to avoid division.

Suppose we are checking a segment S = f1—f2 against L = p—q. Then F must intersect the infinite line through L if f1 and f2 lie on different sides of that line. (Note that neither can be on the L-line, because that would make 3 co-linear points.) That condition can be tested by seeing if the cross product of p—q (with p translated to the origin) with p—f1 has the opposite sign from the cross product p—q with p—f2.



Question 8B (5 points): Consider a segment S that does ***not*** cross the p—q line. Describe a method to decide if S is on the same side of the p-q line as a point r. In the figure above, segment D is on the same side of the p—q line as point r, but segment E is not. (You can assume that no three points involved are co-linear.) Try to avoid division.

Given that S does not intersect the p—q line, then it suffices to check if the line segment from one end of S to r crosses the p—q line or not. Let S = f1—f2. Use the method in 8A to test if the segment f1—r intersects the p—q line. If not, then S and r are on the same side of that line; if so, then they are on opposite sides.