

Homework 8 - Math 531, Frank Thorne (thornef@mailbox.sc.edu)

Due Friday, December 7

For the first three problems, draw four equally spaced points A , B , C , and D , on a line, in that order.

- (1) Compute the cross ratio $cr(A, B, C, D)$.
- (2) Compute the cross ratios $cr(B, A, C, D)$ and (D, C, B, A) .
- (3) There are twenty-four different ways to order the points A , B , C , and D . Determine how many different values of the cross ratio you can get, and compute all of the possible values.
- (4) Draw configurations of four collinear points for which the cross ratio $cr(A, B, C, D)$ is (a) very large, and (b) very small.
- (5) Draw (using a ruler) three points A , B , C on a line with $AB = 3$, $BC = 2$. Use cross ratios to compute points D , E , F , G so that these seven points all appear evenly spaced in perspective. In addition, compute the distance to the “point at infinity” (i.e., the limit of infinitely many such points) and indicate it on your diagram.
- (6) Draw a 3-d perspective drawing of a tunnel, road, railroad, or other such diagram. You may reproduce the diagram done in class (with the distances actually measured properly) or do something else if you prefer. Your drawing should include at least one instance of repeated lengths which appear to be the same when viewed from perspective.

Provide the details of any computations, and explain any steps in your drawing that aren't routine.

(**Bonus.** Do something especially cool.)

- (7) Isaacs, Ch. 3C. Do the second of the exercises labeled 3C.2 (in my copy of the book, the problem numbers are screwed up), 3C.8. **Bonus.** 3C.4, 3C.10.
- (8) Isaacs, 4A.1, 4A.4. **Bonus:** 4A.6.