Class Prep (prepare for Monday, February 12)

Read this for Monday and bring any questions you have on it to discuss in class:

We agreed on Friday that the only thing left for showing that origami can solve quadratic equations is to show that square roots are origami constructible. This is where we need the parabola thing: Suppose r is a number (length of a line segment, in our context) that we've constructed by folding. Goal: construct $\sqrt{r}$ somehow. First, we'll set up a coordinate system as we did when folding the parabola. Let $p_1 = (0, 1)$ be the focus and $L : y = -1$ be the directrix.

Let $p_2 = (0, -\frac{r}{4})$ and fold a crease that places p_1 onto L (at the point $p_1' = (t, -1)$) while making the crease go through p_2.

We already know from the Exploring a Basic Origami move handout that the equation of the crease line is $y = \frac{t}{2}x - \frac{t^2}{4}$ and this line has to go through $(0, -\frac{r}{4})$.

Plugging the point into the line, we get $-\frac{r}{4} = -\frac{t^2}{4}$, so $t = \sqrt{r}$.

Hence, the point where p_1 lands on L gives us the coordinate we want. We did it! Origami wins again!

Problems (due Friday, February 16 at the beginning of class)

1. Show that $\sqrt{-3} + \sqrt{2}$ is algebraic over $\mathbb{Q}$.