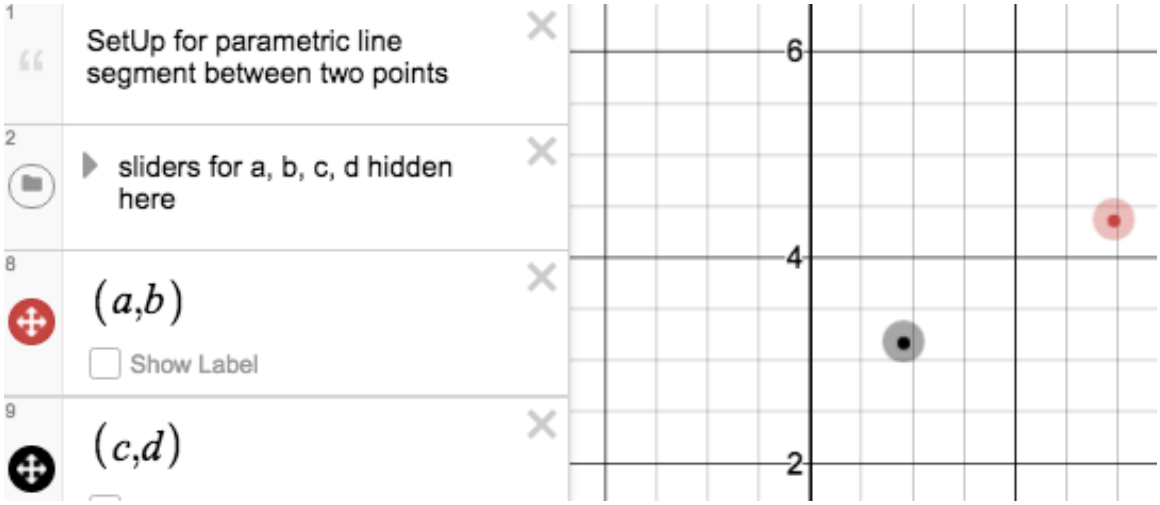
DoNow

1. Consider this statement:

   The integers are to numbers as polynomials are to functions.

   Talk about this with your group.

2. *A parametric line segment*



   (a) Given points (a, b) and (c, d) as well as a parameter $t \in [0, 1]$, write a parametric equations for $x(t)$ and $y(t)$ that gives the line segment between the two points.

   (b) Put your equations together in the form $(x(t), y(t))$ that is used by Desmos.

   (c) Go to the Calculus page of `tetrahedra.net`. At the top of *Places to Visit* click the link for `Desmos setup for parametric line segment` and test your work.

Approximating a function

3. Consider $f(x) = e^x$

   (a) Sketch the graph.

   (b) What do you know about the function at $(0, f(0))$?

   (c) Let $t_1(x)$ be the first degree polynomial (a line) that best approximates $f(x)$ in the neighborhood of $(0, f(0))$. Write an equation for $t_1(x)$ in Taylor form. Briefly explain what *best approximates* might mean here?

   (d) Let $t_2(x)$ be the second degree polynomial (a parabola) that best approximates $f(x)$ in the neighborhood of $(0, f(0))$. Why does it make sense that $t_2(x) = t_1(x) + ax^2$, where a is some constant? (What is this question asking?) Briefly explain what *best approximates* might mean here?

   (e) Let $t_3(x)$ be the third degree polynomial (a cubic) that best approximates $f(x)$ in the neighborhood of $(0, f(0))$. Why does it make sense that $t_3(x) = t_2(x) + bx^3$, where b is some constant? Briefly explain what *best approximates* might mean here?

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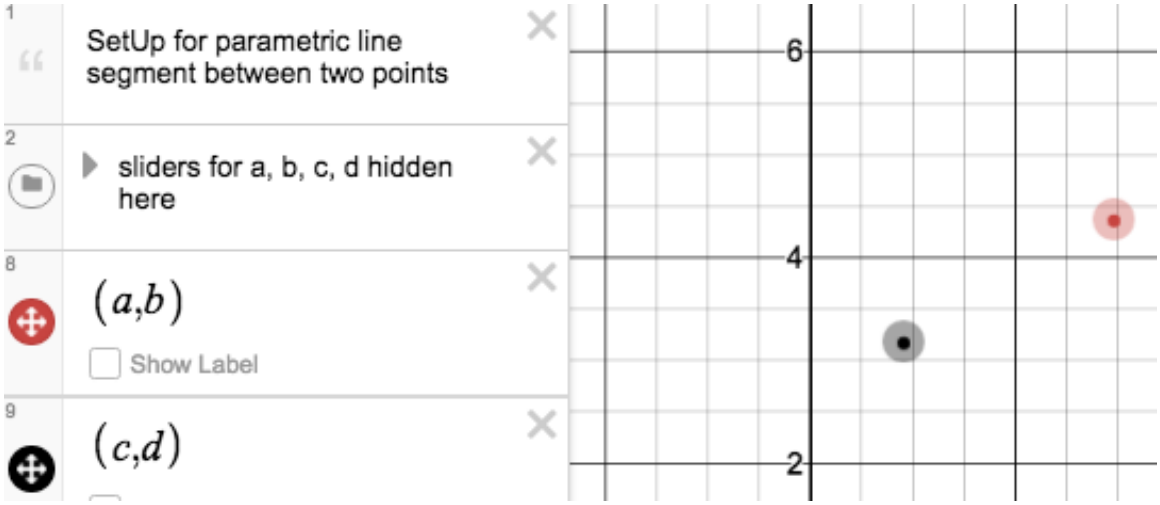

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