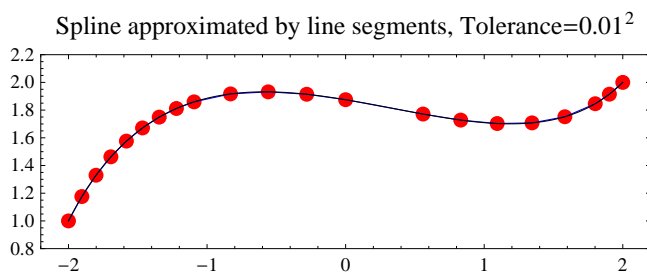
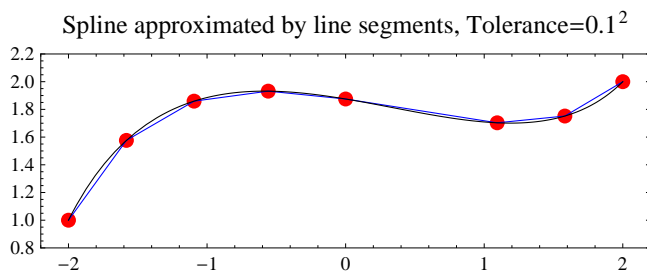
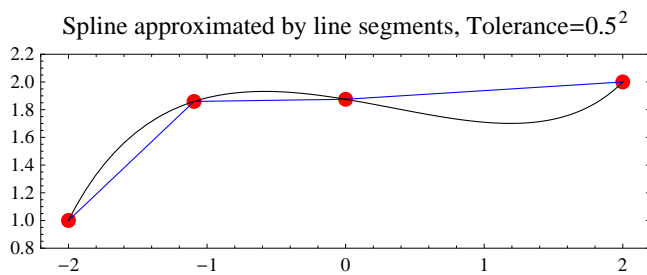
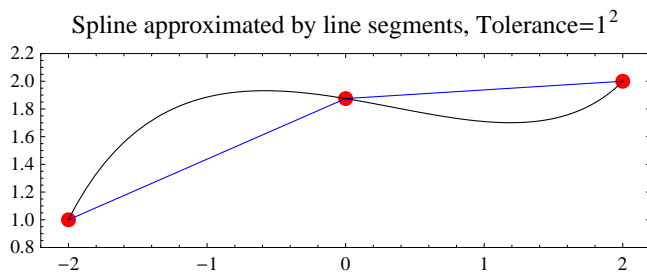


Abstract Muralizer Nonsense

Christoph Maier, 18 May 2009

Cutting corners when drawing splines à la Cairo

Generate points to feed to the microcontroller, trading off resolution against data rate on a cereal interface.



Bresenham Algorithm Fodder: Spooling out thread to draw a straight line

Or, what's a microcontroller that can't do floating point division supposed to do with the sequence of points?

To draw a straight line from $\begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$ to $\begin{pmatrix} x_2 \\ y_2 \end{pmatrix}$ in Cartesian coordinates, the thread lengths $\{r, s\}$ of the spools suspended from the points $\left\{ \begin{pmatrix} X_a \\ Y_a \end{pmatrix}, \begin{pmatrix} X_b \\ Y_b \end{pmatrix} \right\}$ follow the implicit equation

$$\begin{pmatrix} r^2 & s^2 \end{pmatrix} \cdot \begin{pmatrix} A & C \\ C & B \end{pmatrix} \cdot \begin{pmatrix} r^2 \\ s^2 \end{pmatrix} + D = 0$$

with

$$\begin{pmatrix} r^2 & s^2 \end{pmatrix} \cdot \begin{pmatrix} \overline{AB} - \frac{\Delta AB}{2} & C \\ C & \overline{AB} + \frac{\Delta AB}{2} \end{pmatrix} \cdot \begin{pmatrix} r^2 \\ s^2 \end{pmatrix} + D = 0$$

and

$$\overline{AB} \equiv (\delta x^2 + \delta y^2) - 2(\delta x \Delta X + \delta y \Delta Y)^2,$$

$$\Delta AB \equiv 4(\Delta X \delta y - \delta x \Delta Y)(\delta y(x - X_0) - \delta x(y - Y_0)),$$

$$C \equiv -(\delta x^2 + \delta y^2),$$

$$D \equiv (\Delta X^2 + \Delta Y^2)((\Delta X \delta x + \Delta Y \delta y)^2 + 4(\delta y(x - X_0) - \delta x(y - Y_0))^2),$$

where

$$X_0 \equiv \frac{X_a + X_b}{2},$$

$$Y_0 \equiv \frac{Y_a + Y_b}{2},$$

$$\Delta X \equiv \frac{X_b - X_a}{2},$$

$$\Delta Y \equiv \frac{Y_b - Y_a}{2},$$

$$x \equiv \frac{x_1 + x_2}{2},$$

$$y \equiv \frac{y_1 + y_2}{2},$$

$$\delta x \equiv \frac{x_2 - x_1}{2},$$

$$\delta y \equiv \frac{y_2 - y_1}{2}.$$

■ How much rope do I give the pen to hang itself?

