$$\underline{x}'\underline{\underline{A}}\underline{x} + \underline{b}'\underline{x} + c = 0$$

↑ Symmetric

- root finding on

$$t^2(\underline{v}'\underline{\underline{A}}\underline{v}) + t(2\underline{f}'\underline{\underline{A}}\underline{v} + \underline{b}'\underline{v}) + (\underline{f}'\underline{\underline{A}}\underline{f} + \underline{b}'\underline{f} + c) = 0$$

again, straightforward.

One general algebraic surface:

$$p(x,y,z) = 0$$

↑ polynomial.

$Q(t) = 0$, by substitution

Problem 1: find smallest t, $t>0$, s.t. $Q(t)=0$ (primary ray)

Problem 2: is there a $0 \leq t \leq 1$ such that $Q(t)=0$ (shadow ray).

Root finding techniques:

Exact (Sturm seqs, etc)
Numerical (Newton's method).
Coherence