13.6: Example

As we proceed with the theory, we shall try an actual numerical example as we go. We shall suppose that the following three observations are available:

0^h TT	R.A. (J2000.0)	Dec. (J2000.0)
2002 Jul 10	$21^h\ 15^m.40$ $= 318^\circ.8500$ = 5.564 982 rad	$+16^\circ\ 13'.8$ $= +16^\circ.2300$ = +0.283 267 rad
2002 Jul 15	$21^h\ 12^m.44$ $= 318^\circ.1100$ = 5.552 067 rad	$+16^\circ\ 03'.5$ $= +16^\circ.0583$ = + 0.280 271 rad
2002 Jul 25	$21^h\ 05^m.60$ $= 316^\circ.4000$ = 5.522 222 rad	$+15^\circ\ 24.8$ $= +15^\circ.4133$ = + 0.269 013 rad

We shall suppose that the times given are 0^h TT, and that the observations were made by an observer at the centre of Earth. In practice, an observer will report his or her observations in Universal Time, and from the surface of Earth. We shall deal with these two refinements at a later time.

The "observations" given above are actually from an ephemeris for the minor planet 2 Pallas published by the Minor Planet Center of the International Astronomical Union. They will not be expected to reproduce exactly the elements also published by the MPC, because the ephemeris positions are rounded off to $0^m.01$ and $0'.1$, and of course the MPC elements are computed from all available observations, not just three. But we should be able to compute elements close to the correct ones. Observations are usually given to a precision of about 0.1 arcsec. For the purposes of the illustrative calculation let us start the calculation with the right ascensions and declinations given above to six decimal places as exact.