

[6.63] Faster numerical matrix inverses

The calculator has a built-in matrix inverse operator, $^{-1}$, but the C program *inv()*, by Rafael Humberto Padilla Velazquez, is much faster for inverses of matrices with floating-point elements. The call syntax is

```
inv(m)
```

where *m* is the matrix or matrix name. The matrix inverse is saved in the global variable *_asminfo*.

This table shows some typical execution times for random integer matrices of various sizes.

Matrix size	m^{-1}	Maximum residual	<i>inv(m)</i>	Maximum residual
5 x 5	2.1 sec	2E-13	1.8 sec	1E-13
10 x 10	15.3 sec	6.9E-13	3.1 sec	1.4E-13
15 x 15	60.6 sec	1.6E-12	11.4 sec	7E-13
20 x 20	177.2 sec	2.1E-12	28.6 sec	6.8E-13

inv() is considerably faster than the built-in inversion, and the residuals slightly better, as well. The residual is the element with the largest absolute value of matrix *E*, where

$$E = M \cdot M^{-1} - I$$

M is the original matrix and *I* is the identity matrix. So, the residual is not actually the error in the inverse, but instead the 'round-trip' error in finding the inverse and evaluating the identity above.