

```

> restart;
with(LinearAlgebra):
> A,b := RandomMatrix(3,3), RandomVector(3);

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$$A, b := \begin{bmatrix} 27 & 99 & 92 \\ 8 & 29 & -31 \\ 69 & 44 & 67 \end{bmatrix}, \begin{bmatrix} -32 \\ -74 \\ -4 \end{bmatrix} \quad (1)$$

```

> x := LinearSolve(A,b);

```

$$x := \begin{bmatrix} -\frac{54207}{163622} \\ -\frac{207597}{163622} \\ \frac{182389}{163622} \end{bmatrix} \quad (2)$$

```

> p := prevprime(10^4);

```

$$p := 9973 \quad (3)$$

Solve  $A \cdot x = b$  modulo  $p, p^2, p^3, \dots$

```

> u := x mod p;

```

$$u := \begin{bmatrix} 4427 \\ 6677 \\ 1922 \end{bmatrix} \quad (4)$$

```

> y := iratrecon(u,p);

```

$$y := \text{FAIL} \quad (5)$$

```

> u := x mod p^2;

```

$$u := \begin{bmatrix} 60351050 \\ 78613863 \\ 95533289 \end{bmatrix} \quad (6)$$

```

> y := iratrecon(u,p^2);

```

$$y := \text{FAIL} \quad (7)$$

```

> u := x mod p^3;

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$$u := \begin{bmatrix} 432416140013 \\ 251614797504 \\ 410967804788 \end{bmatrix} \quad (8)$$

```

> y := iratrecon(u,p^3);

```

$$y := \begin{bmatrix} -\frac{54207}{163622} \\ -\frac{207597}{163622} \\ \frac{182389}{163622} \end{bmatrix} \quad (9)$$

> A.y-b;

$$\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \quad (10)$$

> d := ilcm( denom(y[1]), denom(y[2]), denom(y[3]) );  
*d:= 163622*

(11)

> A.(d\*y)-(d\*b);

$$\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \quad (12)$$

> ?iratecon