(K)

The circulant $\begin{vmatrix} 1 & 9 & 6 & 7 \\ 7 & 1 & 9 & 6 \\ 6 & 7 & 1 & 9 \\ 9 & 6 & 7 & 1 \end{vmatrix} = -3^2(23)(29)$.

$\begin{vmatrix} 1 & 7 \\ 6 & 9 \end{vmatrix}$ divides $\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 6 & 7 & 6 \\ 6 & 7 & 6 & 9 \\ 7 & 6 & 9 & 1 \end{vmatrix}$, that is, $\dfrac{3(11)^2}{-3(11)} = -11$.

$\begin{vmatrix} 1 & 9 \\ 7 & 6 \end{vmatrix}$ divides $\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 1 & 1 & 6 \\ 6 & 1 & 1 & 9 \\ 7 & 6 & 9 & 1 \end{vmatrix}$, that is, $\dfrac{9(11)(19)}{-3(19)} = -33$.

$\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 9 & 9 & 6 \\ 6 & 9 & 9 & 9 \\ 7 & 6 & 9 & 1 \end{vmatrix} = 9^3.$ $\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 6 & 6 & 6 \\ 6 & 6 & 6 & 9 \\ 7 & 6 & 9 & 1 \end{vmatrix} = 3^3(43).$ $\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 7 & 7 & 6 \\ 6 & 7 & 7 & 9 \\ 7 & 6 & 9 & 1 \end{vmatrix} = 3^2(113)$.

$\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 0 & 0 & 6 \\ 6 & 0 & 0 & 9 \\ 7 & 6 & 9 & 1 \end{vmatrix} = 45^2.$ $\begin{vmatrix} 1 & 9 & 6 & 7 \\ 9 & 6 & 7 & 0 \\ 6 & 7 & 0 & 0 \\ 7 & 0 & 0 & 0 \end{vmatrix} = 7^4$.

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(Continued from p. 473.)

Of the twenty-four four-digit numbers that can be written with the digits of 1967, seven are prime:

6197, 6197, 6719, 6791, 6917, 6971, and 7691 .

(F) $- \begin{vmatrix} 1 & 9 \\ 6 & 7 \end{vmatrix} = 47$.

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