1 Introduction, Day 4

Today we talk about another idea, parallel and orthogonal cages. These are different ideas, but we group them together here for convenience. Besides reading this Day 4 discussion, your homework for tomorrow is the P puzzle. Again it will be interesting to get reports of where your breakthrough occurred.

2 Parallel Cages

Suppose a two-cell cage $[n*]$ appears in two parallel lines in the same position within the line. For example,

```
  n*
  n*
```

Then the required uniqueness of the solution implies that the two cages cannot be filled with the same two-element set. Consider the example below. Find the value of $x$.

```
a
b
```

3 Orthogonal Cages

A simple example of orthogonality is shown below.
Find the value of $x$.

In this final example, we show how using a combination of the ideas above can solve a very demanding problem. Consider the $6 \times 6$ KenKen fragment. Find the value of $x$. A solution is given on the next page. See if you can make progress before looking. Note that the $x$ is in the top cell of a $[3-]$ cage. The lower cell of that cage is not shown.
4 Exercises


\[
\begin{array}{cccccc}
7+ & 2+ & 11+ & 3- & 9+ & x, y \\
& & & & x, y & \\
\end{array}
\]

2. Consider the $6 \times 6$ KenKen fragment. Find the candidates for the value of $x$ and $y$.

\[
\begin{array}{cccccc}
7+ & 7+ & 30\times & 2- & 2 & x, y \\
& & & x, y & & \\
\end{array}
\]

3. Consider the $6 \times 6$ KenKen fragment. Find the candidates for four cages in the fragment.

\[
\begin{array}{cccccc}
2\div & 1- & 2\div & 30\times & 2\div & 15\times \\
& & & & & \\
\end{array}
\]

4. Consider the $6 \times 6$ KenKen fragment. Find the candidates for $[3-]$ cage.

\[
\begin{array}{cccccc}
2- & 2- & 3- & x, y & x, y & \\
& & & & & \\
\end{array}
\]

5. Consider the $6 \times 6$ KenKen fragment. Find the candidates for clueless cage.

\[
\begin{array}{cccccc}
6\times & 12\times & x, y & x, y & \\
& & & & & \\
\end{array}
\]