KenKen® puzzles are square (this one happens to be $4 \times 4$, but they can be of any size). Like Sudoku, the solution requires that an $n \times n$ puzzle contain the digits 1 through $n$ exactly once in each row and column, but in any order. In addition, the puzzle board is divided into possibly irregular cages, and these cages usually have an indication of a goal and an operation. Sometimes there are $1 \times 1$ cages that simply have a number to be inserted into the cage. If the operation is $+$ or $\times$, then the sum (or product) of all the numbers in that cage have to yield the target number. If the operation is $-$ (or $\div$), then the cage must consist of two squares (also called cells) and the difference (or quotient) of the two numbers must yield the target number. The numbers can be in any order in the cages. Solve the $4 \times 4$ KenKen puzzle below. Solve the $4 \times 4$ KenKen puzzle below. In standard KenKen, there is only one solution. Most of the problems in this set are standard, but some are not. In this set of problems, you’re be able to construct your own puzzles and eventually prove that they have unique solutions or you will find all the solutions.
Let’s try a $4 \times 4$ KenKen puzzle that’s a little harder. Here again we’re using the numbers 1 through 4 and the solution is unique. One way to start might be to see if you can find the sum of the entries in the $[32\times]$ cage.
Using the same cage structure, but moving now to a so-called Turbo Kenken puzzle where the four numbers to be used are not given. So now your task is to find the four numbers and distribute them so that subject to the same rules. That is, there must be one such number in each row and column and all the clues must be satisfied. There is just one set of four numbers that can fill the cages here, but there is one other catch. We don’t guarantee a unique solution.
Use the numbers 1, 2, 3 and 4 to solve the $4 \times 4$ puzzle below. It has more than one solution. Find all the solutions.
Next, we want you to use the numbers 2, 4, 6 and 8 to solve the $4 \times 4$ puzzle below that you create. You can look carefully at the last problem. Find the clues that will enable you to solve this puzzle in the same way you solved the one above. In other words, you’re building an isomorphic puzzle, one that is for all practical purposes, the same as the one above. Find all the solutions.
The next problem is yours to build. Take the same cage structure that we have been using. Distribute four 1’s in four different rows and columns. Then put four 2’s in the grid so that again each row and column is occupied by a 2. Next carefully distribute the 3’s, making sure that you leave room for the four 4’s to be in four different rows and columns. This might take a few tries before you get it. Then make decisions about the clues to use in each of the four cages. You might notice that multiplicative clues are more revealing than additive clues. Once you’ve built your puzzle, try proving that it has a unique solution. It might not, in which case your challenge is to find all the solutions, not just the one you started with.