coursera

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Optional Enrichment on Conditionals and Loops

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These exercises from our book *Computer Science: An Interdisciplinary Approach* are an opportunity to study in further depth what you have learned from the lectures.

1.3.21 Write a program Kary that takes two integer command line arguments i and k and converts i to base k. Assume that i is an integer in Java's long data type and that k is an integer between 2 and 16. For bases greater than 10, use the letters A through F to represent the 11th through 16th digits, respectively.

1.3.28 Run quick experiments to determine the impact of using the termination condition (factor <= n/factor) instead of (factor < n) in Factors in Program 1.3.9. For each method, find the largest n such that when you type in an n-digit number, the program is sure to finish within 10 seconds.

1.3.31 Write a program RelativelyPrime that takes an integer command-line argument n and prints an n-by-n table such that there is an * in row i and column j if the gcd of i and j is 1 (i and j are relatively prime) and a space in that position otherwise.

1.3.34 *Ramanujan's taxi.* Srinivasa Ramanujan was an Indian mathematician who became famous for his intuition for numbers. When the English mathematician G. H. Hardy came to visit him one day, Hardy remarked that the number of his taxi was 1729, a rather dull number. To which Ramanujan replied, "No, Hardy! No, Hardy! It is a very interesting number. It is the smallest number expressible as the sum of two cubes in two different ways." Verify this claim by writing a program that takes an integer command-line argument n and prints all integers less than or equal to n that can be expressed as the sum of two cubes in two different ways. In other words, find distinct positive integers a, b, c, and d such that a^3 + b^3 = c^3 + d^3. Use four nested for loops.