Analysis of Algorithms: Assignment 5

Due date: February 26 (Wednesday)

Problem 1 (5 points)
Write an algorithm $\textsc{Shuffle}(A, n)$ that randomly re-orders an array $A[1..n]$, that is, generates one of its permutations; the probabilities of all permutations must be the same. You may use the $\textsc{Random}(p, r)$ procedure, which returns a random integer between p and r.

Problem 2 (5 points)
This problem is inherited from Exam 1; you should write a solution even if you received credit for solving it during the exam.

Consider a programming language that allows only integer numbers and supports addition, subtraction, and multiplication; the running time of each operation is constant. The language does *not* have operations for division and exponentiation. Write an efficient algorithm $\textsc{Divide}(n, m)$ that computes $\lfloor n/m \rfloor$, where n and m are positive integers, and give the time complexity of your algorithm. If its complexity is better than $\Theta(\lfloor n/m \rfloor)$, you may earn up to ten bonus points for this assignment.