

Discrete Mathematics

Homework 4

Due 2:20 pm, May 17, 2011

The following are exercises which you can practice at the Lab sessions or at home. The textbook gives out answers or hints. DO NOT hand in your solutions.

- Exercises 3.4.2, 3.4.6;
- Exercises 3.5.3;
- Exercises 4.1.16, 4.1.17;
- Exercises 4.3.6, 4.3.12.
- Python exercise: Define a recursive function `fac(n)` such that `fac(n)` computes $n!$ for an integer $n \geq 1$, and it returns 1 when $n \leq 0$.
- Python exercise: Define a recursive function `P(n, r)` such that

$$P(n, r) = \begin{cases} n \cdot (n-1) \cdot (n-2) \cdots (n-r+1) & \text{if } n \geq r > 0 \\ 1 & \text{otherwise.} \end{cases}$$

- Python exercise: One can express the “ n choose r ” function $C(n, r)$ in several ways (assuming $n \geq r \geq 0$):
 - $C(n, r) = \frac{n!}{r!(n-r)!}$
 - $C(n, r) = \frac{P(n, r)}{r!}$
 - $C(n, r) = \begin{cases} C(n-1, r-1) + C(n-1, r) & \text{if } n > r > 0 \\ 1 & \text{if } n = r \text{ or } r = 0. \end{cases}$

According to the above definitions, write three different Python functions for $C(n, r)$.

The following are homeworks. You MUST hand in your solutions by the due date.

- Exercise 3.4.19;
- Exercise 3.5.15;
- Exercise 4.1.15, 4.1.19;
- Exercise 4.2.7, 4.2.18;
- Exercise 4.3.7, 4.3.19;
- Exercise 4.4.9, 4.4.18.

PLEASE NOTE, NO EXCEPTION

- Homework is due **before the class begins** on May 17, 2011. Late homework will not be accepted.
- Do the homework by yourself. Discussion among peers is encouraged but **copying from others is a shame**.