Computer Science Olympiad
Penn State Hazleton

First Round, Spring 2010

Deadline: February 19, 2010

Problem 1 [*Fraction Expression*] Write a program that evaluates the following expression:

$$expr\,(n,\,x) = 1 + \cfrac{2^n + 2x^n}{2 + \cfrac{2^{n-1} + 3x^{n-1}}{3 + \cfrac{2^{n-2} + 4x^{n-2}}{\displaystyle\cdots\cdots}}}$$

$$(n-1) + \cfrac{2^2 + nx^2}{n + \cfrac{2^1 + (n+1)x^1}{x}}$$

where: x – *real number*, $x > 0$, n – *integer*, $n > 0$.

Input Data:
```
n x
```

Output:
```
expr(n, x)
```

Problem 2 [*Maximal Common Substring*] Given are two strings s1 and s2 which characters are decimal digits. A string s is called *maximal common substring* (MCS) for s1 and s2, if the following three conditions hold true:
    a) s is a substring of both s1 and s2;
    b) the value of s as a decimal number is the biggest possible (maximum);
    c) the length of s is equal or less than 9.
Write a program that calculates a MCS of the two given strings.

Input Data:
```
s1        // string of characters that are decimal digits {'0', '1', …, '9'}
s2        // string of characters that are decimal digits {'0', '1', …, '9'}
```

Output:
```
s         // CMS substring of s1 and s2
```

Example:
```
Input Data:
s1 = "12392982456430988789900878010100202000303"
s2 = "11116430010101123020202020"

Result:
s = "643"
```