Det Matematisk-naturvitenskapelige fakultet
Universitet i Bergen
Eksamen i emnet INF 109 - Dataprogrammering for naturvitskap,
Onsdag 21. May 2014, kl. 09-12
NORSK

Opplysninger:
Eksamen består av 6 sider med til sammen 3 spørsmål. Svar på **ALLE** *spørsmål, hvis du kan.*

1 Spørsmål 1

Spørsmål 1a (4 poeng)

```
def Fib(n):
    Fa = 0
    Fb = 1
    Sequence = ""
    for i in range(n):
        Fc = Fa
        Fa = Fb
        Fb += Fc
        Sequence += str(Fa) + ","
    print(Sequence)
```

Skrive ned utdata når `Fib(11)` kalles.

Spørsmål 1b (12 poeng)

```
def spiralA(winsize,Iter,Scaling):
    win = GraphWin("2D sequence representation",winsize,winsize)
    xpos = int(winsize/2)
    ypos = int(winsize/2)
    Coeff = [1,-1,-1,1]
    Index = 0
    Fa = 1
    Fb = 1
    upos = xpos - (Scaling * Fb)
    vpos = ypos + (Scaling * Fb)
    Sq = Rectangle(Point(xpos,ypos),Point(upos,vpos))
    Sq.draw(win)
    for i in range(Iter):
        Ind = Index % 4
        upos = xpos + (Coeff[Ind] * (Scaling * Fb))
        vpos = ypos + (Coeff[(4-Ind)%4] * (Scaling * Fb))
        Sq = Rectangle(Point(xpos,ypos),Point(upos,vpos))
        Sq.draw(win)
        xpos = upos
        ypos = vpos
        Fc = Fb
        Fb += Fa
        Fa = Fc
        Index += 1
    win.getMouse()
    win.close()
```

Skissere output når `spiralA(700,3,80)` kalles.

Spørsmål 1c (6 poeng)

```
def DrawSpiral(x,y,u,v,win):
    Lin = Line(Point(x,y),Point(u,v))
    Lin.draw(win)

def spiral(winsize,Iter,Scaling,Spir):
    win = GraphWin("2D sequence representation",winsize,winsize)
    xpos = int(winsize/2)
    ypos = int(winsize/2)
    Coeff = [1,-1,-1,1]
    Index = 0
    Fa = 1
    Fb = 1
    upos = xpos - (Scaling * Fb)
    vpos = ypos + (Scaling * Fb)
    Sq = Rectangle(Point(xpos,ypos),Point(upos,vpos))
    Sq.draw(win)
    Label = Text(Point(int((xpos + upos)/2), int((ypos + vpos)/2)), str(Index+1))
    Label.draw(win)
    for i in range(Iter):
        Ind = Index % 4
        upos = xpos + (Coeff[Ind] * (Scaling * Fb))
        vpos = ypos + (Coeff[(4-Ind)%4] * (Scaling * Fb))
        Sq = Rectangle(Point(xpos,ypos),Point(upos,vpos))
        Sq.draw(win)
        if Spir:
            DrawSpiral(xpos,ypos,upos,vpos,win)
        Label = Text(Point(int((xpos + upos)/2), int((ypos + vpos)/2)), str(Index
            +2))
        Label.draw(win)
        xpos = upos
        ypos = vpos
        Fc = Fb
        Fb += Fa
        Fa = Fc
        Index += 1
    win.getMouse()
    win.close()
```

Skissere output når `spiral(700,6,20,0)` kalles.

Spørsmål 1d (6 poeng)

Skissere output når `spiral(700,6,20,1)` kalles.

2 Spørsmål 2

Spørsmål 2a (6 poeng)

```
def LFSRA(Reg,Stop):
    print(Reg)
    if Reg != Stop:
        X = Reg[4]
        Reg[4] = Reg[3]
        Reg[3] = Reg[2]
        Reg[2] = (Reg[1] + X) % 2
        Reg[1] = Reg[0]
        Reg[0] = X
        LFSRA(Reg,Stop)
```

Skrive ned utdata når `LFSRA([0,0,0,1,1],[0,1,1,1,1])` kalles.

Spørsmål 2b (6 poeng)

```
def LFSRB(Reg,Stop):
    Index = 0
    for i in range(len(Reg)):
        Index = (Index * 2) + int(Reg[len(Reg)-i-1])
    print(Index)
    if Reg != Stop:
        X = Reg[4]
        Reg[4] = Reg[3]
        Reg[3] = Reg[2]
        Reg[2] = (Reg[1] + X) % 2
        Reg[1] = Reg[0]
        Reg[0] = X
        LFSRB(Reg,Stop)
```

Skrive ned utdata når `LFSRB([0,0,1,1,1],[1,1,0,1,1])` kalles.

Spørsmål 2c (6 poeng)

```
def LFSR(Reg,Stop,Book,Message):
    Index = 0
    for i in range(len(Reg)):
        Index = (Index * 2) + int(Reg[len(Reg)-i-1])
    Message = Message + str(Book[Index])
    if Reg != Stop:
        X = Reg[4]
        Reg[4] = Reg[3]
        Reg[3] = Reg[2]
        Reg[2] = (Reg[1] + X) % 2
        Reg[1] = Reg[0]
        Reg[0] = X
        LFSR(Reg,Stop,Book,Message)
    else:
        print(Message)
```

Skrive ned utdata når `LFSR([1,0,1,0,0],[1,0,0,0,1],"XBEARIVWOPSTQRZUPMWEKRLJBTEVFNGC","")` kalles.

Spørsmål 2d (8 poeng)

```
def Permut(Table,PermRow,PermCol,Size,Iter):
    for k in range(Iter):
        NewTable = ["xxxxxx"]*Size
        for i in range(Size):
            Row = list(NewTable[i])
            for j in range(Size):
                Row[j] = Table[PermRow[i]][PermCol[j]]
            NewTable[i] = ''.join(Row)
        Table = NewTable
    print(Table)
```

Skrive ned utdata når `Permut(["ESPLMI", "EFONRO", "YIERVS", "ETODCO", "NPHOTY", "XSTANY"],[5,0,2,1,3,4],[4,3,0,5,1,2],6,2)` kalles.

3 Spørsmål 3

File: **animals.txt**:

```
Giraffe     Orange    22     91    42    5    6
Owl         Yellow    42     43    52   36   20
Rabbit      Red       52     50    40   47
Dog         Yellow    65     25    77    9
Frog        Green     61     27    73   11   112   92
Lion        Red       65     64    52   45
Eagle       Green     25     29    31   12
Zebra       Red       31     30    29
```

Spørsmål 3a (6 poeng)

```
def animA(fnam):
    afil = open(fnam + ".txt","r")
    for line in afil:
        ln = line.split()
        k = 0
        r = len(ln)-2
        for i in range(r):
            k += int(ln[2+i])
        newln = [ln[0],ln[1],str(round(k/r))]
        newline = "\t\t".join(newln)
        print(newline)
    afil.close()
```

Skrive ned utdata når `animA("animals")` kalles.

Spørsmål 3b (8 poeng)

```
def animB(fnam):
    Colours = ["Green","Blue","Red","Orange","Purple","Yellow"]
    SortAnim = [[] for _ in range(len(Colours))]
    afil = open(fnam + ".txt","r")
    for line in afil:
        ln = line.split()
        k = 0
        r = len(ln)-2
        for i in range(r):
            k += int(ln[2+i])
        SortAnim[Colours.index(ln[1])].append("\t\t".join([ln[0],ln[1],str(round(k
            /r))]))
    for i in range(len(Colours)):
        for j in SortAnim[i]:
            print(j)
    afil.close()
```

Skrive ned utdata når `animB("animals")` kalles.

Spørsmål 3c (6 poeng)

```
def anim(fnam):
    Colours = ["Green","Blue","Red","Orange","Purple","Yellow"]
    SortAnim = [[] for _ in range(len(Colours))]
    afil = open(fnam + ".txt","r")
    for line in afil:
        ln = line.split()
        k = 0
        r = len(ln)-2
        for i in range(r):
            k += int(ln[2+i])
        SortAnim[Colours.index(ln[1])].append("\t\t".join([ln[0],ln[1],str(round(k
            /r))]))
    for i in range(len(Colours)):
        SortAnim[i].sort()
        for j in SortAnim[i]:
            print(j)
    afil.close()
```

Skrive ned utdata når `anim("animals")` kalles.