

createTexTests - code to create tex and pdf files with tables of answers sheet and multiple-choice questions randomly

This software creates a **tex** file (and the corresponding **pdf**) with questions multiple-choice and / or dissertation, can add an answer sheet on the first page of each test, grouped by classes of students. In addition, the software can create a file with the template to each student, if you choose the option of random tests. Thus, the tests may be individual and unique to each student and will be generated from csv files of student groups, including the registration number and name of the student. The code was developed in the python programming language.

The full content of this document can be downloaded from

- <http://vision.ufabc.edu.br/MCTest> (<http://vision.ufabc.edu.br/MCTest>) or
- <https://github.com/fzampirolli/MCTest4> (<https://github.com/fzampirolli/MCTest4>)

List folders needed to run the program:

- courses
- questions
- figs

The files *class.csv* of the subfolders of *courses* will be read, which contains the data of the students. For example, consider the file *./courses/course2016q2/2016_BC0505_q2_A2.csv* containing only 2 students of the class *2016_BC0505_q2_A1*, with the following:

```
11000123; Fulano Junior
11000111; Gustavo Neto
```

The multiple-choice questions follow the following format: issues classified as easy (QE::), medium (QM::) and hard (QH::). For example, see the file contents. *./questions/testp1/questions1.txt*. There is also the possibility of creating text questions (QT::) without alternatives.

Within each group of easy, medium and hard questions, optionally, you can create subject(s) of the question and also create subclasses. For subclasses **the goal is to define variations of a question and to take only a matter of each subclass**. For this, another delimiter is designed with just one character to define each subclass. For example, QE::a::, QE::b::, ..., QE::A::, QE::B::, ..., QE::0::, QE::1::, ..., QE::9::. The contents of each question and each alternative follows the formatting **latex**, disregarding the sequence of line start characters QE::, QM::, QH::, QT:: and A: and the characters "::. Here's an example questions file:

```
QE::Assunto 1::a:: pergunta fácil Q1a1 - com exemplo de fórmula em tex, com a
primeira variação da subclasse a:

$$\sin A \cos B = \frac{1}{2} \left[ \sin(A-B) + \sin(A+B) \right]$$

% esta linha é um comentário
A: resposta 1a1-a
A: resposta 1a1-b
```

```
A: resposta 1a1-b
A: resposta 1a1-c
A: resposta 1a1-d
A: resposta 1a1-e
```

```
QE::Assunto 1::a:: pergunta fácil Q1a2 - com segunda variações da subclasse a:
A: resposta 1a2-a
A: resposta 1a2-b
A: resposta 1a2-c
A: resposta 1a2-d
A: resposta 1a2-e
```

```
QE::Assunto 1::a:: pergunta fácil Q1a3 - com terceira variações da subclasse a:
A: resposta 1a3-a
A: resposta 1a3-b
A: resposta 1a3-c
A: resposta 1a3-d
A: resposta 1a3-e
```

```
QM::Assunto 2:: pergunta q2 classificada como média
A: resposta 2a - para provas aleatórias, sempre a primeira resposta é a correta
A: resposta 2b
A: resposta 2c
A: resposta 2d
A: resposta 2e
```

```
QH::Assunto 3:: pergunta cQ3
A: resposta 3a
A: resposta 3b
A: resposta 3c
A: resposta 3d
A: resposta 3e
```

The alternative of the each question should follow the characters "A:". **For random questions, the first alternative is the correct.** Inside subfolder of the questions folder, always use the same number of alternatives.

Include textual questions (optional)

```
QT:: O programa abaixo lê dois valores para as variáveis X e Y, efetua a troca
dos valores de forma que a variável X passe a ter o valor de Y, e que a variável
Y passe a ter o valor de X. Complete a(s) instrução(ões) "AQUI".
```

```
\begin{verbatim}
programa
{
    funcao inicio()
    {
        real X, Y, aux
        leia (X, Y)
        "AQUI"
        escreva(X, Y)
    }
}
\end{verbatim}
```

```
\drawLines{12}
```

QT:: Escreva um programa para inverter os elementos com conteúdos pares que estão nas posições ímpares de um vetor de inteiros com X elementos (caso existam), onde X é um inteiro definido pelo usuário.

```
\drawLines{15}
```

To run the program *createTexTests*

Install

- language **ipython**: <https://store.continuum.io/cshop/anaconda> (<https://store.continuum.io/cshop/anaconda>), version 64bits python 2.7
- latex:
 - mac: <https://tug.org/mactex/mactex-download.html> (<https://tug.org/mactex/mactex-download.html>)
 - linux: `sudo apt-get install texlive texlive-latex-extra texlive-lang-portuguese`
 - windows: <http://miktex.org/download> (<http://miktex.org/download>)

Download the folder that is <https://github.com/fzampirolli/MCTest4> (<https://github.com/fzampirolli/MCTest4>) (top right Download ZIP), which will be saved in your disk: **MCTest4-master.zip**; Unzip.

Open a terminal and go to the folder:

```
cd *./MCTest4-master/
```

Edit/create the questions files in `./questions/testp1/questions1.txt` and the students groups files `./courses/course2016q2/2016_BC0505_q2_A2.csv`. If necessary, create or rename subfolders on *questions* and *courses* and the files *txt* and *csv*.

After installation, to run the program *createTexTests.py*, for example:

```
ipython createTexTests.py config_en.txt
```

The **config.txt** file must be changed according to user needs. However, you should not change the variable names before the first `::` in each row. See an example below:

```
numQE           :: 4           :: number of easy questions
numQM           :: 3           :: number of mean questions
numQH           :: 2           :: number of hard questions
numQT           :: 2           :: number of textual questions
folderCourse    :: course2016q2 :: folder containing the classes in csv files
folderQuestions :: testp1       :: folder containing the database issues in txt
files
randomTests     :: 1           :: =0, questions not random
MCTest_sheets   :: 2           :: =0 only answer sheet; =1 only questions; =2 cc
template        :: 1           :: =0, unsaved file with the templates *_GAB
duplexPrinting  :: 1           :: =0, printing on one side of the sheet, cc, printing
double-sided
maxQuestQuadro  :: 20          :: maximum number of questions per answer sheet
maxQuadrosHoz   :: 4           :: maximum number of questions in horizontally
headerByQuestion :: 1         :: =1 a header by textual question
```

```

title           :: Universidade Federal do ABC
course          :: Processamento da Informação - BC0505
teachers        :: Francisco de Assis Zampirolli
period          :: 2/2016
modality        :: Presencial
date            :: 22/06/2016
logo            :: ufabc.eps    :: logo in figs folder
language        :: english     :: for now, portuguese or english

```

```
instructions1 ::
```

```

1. Paint only INSIDE OF THE CIRCLES of each question.  2. No Rasure. 3. Each
question has only one correct answer.
4. It will be considered only the answers in "Part 1" area on this page to the
questions of multiple choice.

```

```
instructions2 ::
```

```

1. It is prohibited to search books and notes.  2. The use of electronic devices
is prohibited. 3. It will be
considered only the answers in "Part 1" area of the Multiple-Choice Questions
page.

```

```
instructions3 ::
```

```

titPart1 :: Parte 1 - Answer Sheet - Do not use this sheet as a draft!
titPart2 :: Parte 2 - Multiple-Choice Questions
titPart3 :: Parte 3 - Textual Questions

```

```
endTable ::
```

```

\begin{table}[h]
\centering
\textbf{Calculation of concepts} \\\ \vspace{5mm}
\begin{tabular}{|c|c|c|c|} \hline
Questions 1-12 & Textual Questions & Final\\ \hline
& & \\\
& & \\\
& & \\\ \hline
\end{tabular}
\end{table}

```

After runnign the *createTexTests.py* program, will be created for each course two files into *tex/course2016q2/testp1/*, for example to the course defined in the file *./courses/course2016q3/2016_BC0505_q2_A2.csv*:

- 2016_BC0505_q2_A1.tex
- 2016_BC0505_q2_A1.pdf

If **randomTests** variable into **config.txt** have value 1, random questions will be created and this folder will also be generated the file with template for each student:

- 2016_BC0505_q2_A1__yourEmail@domain.com_GAB

NOTE: every time that *createTexTests.py* is run, will create a only file with the template of the each student, erasing earlier versions with the same name. It is recommended to rename the GAB file with your email and make a copy in **./corrections** folder, where the automatic correction of the tests will be made. This GAB file

can be used for automatic corrections using MCTest, as detailed in the following.

Questions Bank

For the number of questions needed to have a probalibidade downtown occur in two tests equal in next students, consider the formula *Simple Combination*, that is, it is required to test with p distinct questions ($p < m$), and m is the total number of questions in the bank.

Formula: $C(m, p) = m! / [(m - p)! p!]$

Calculation for an example: $C(15, 10) = 20! / [5! 10!] = 3003$

In [1]:

```
import math
def mCp(m,p):
    f = math.factorial
    return f(m) / (f(m-p)*f(p))
mCp(15,10)
```

Out[1]:

3003

The test generator sorts the easy, medium and hard questions in this order. So if you have 5 easy questions in the bank and if you want a test with three different easy questions, the generator will create 10 distinct test of easy questions. If this is repeated to the medium (with a question less) and difficult (with two questions less), see:

In [2]:

```
print "easy =",mCp(5,3)
print "medium =",mCp(5,2)
print "hard =",mCp(5,1)
print "distinct tests =",mCp(5,3)*mCp(5,2)*mCp(5,1)
```

```
easy = 10
medium = 10
hard = 5
distinct tests = 500
```

Thus, the probability of a test be equal another test is only 0.2%, see:

In [3]:

```
1.0/500.0*100
```

Out[3]:

0.2

However, considering only the hard questions, the probability of a test have the same difficult question of another test (next) is only 4%, see:

In [4]:

```
1.0/5 * 1.0/5*100
```

Out[4]:

```
4.0
```

To Correct the tests using MCTest

Scan the answers sheet of each student in pdf format, resolution 150dpi, grouped into classes of students, with the following name pattern:

2016_BC0505_q2_A1__yourEmail@domain.pdf

Send this file and the file below with the templates (generated by *createTexTexts.py* program) by ftp:

2016_BC0505_q2_A1__yourEmail@domain_GAB

To send by ftp these files enter in *shell*:

```
ftp vision.ufabc.edu.br
Name (vision.ufabc.edu.br:fz): anonymous
```

Switch to the folder where will be made the **uploads** of files on the server:

```
ftp> cd upload
ftp> cd MCTest4
```

The only restriction is to use a particular file name, where before "__" (two *underlines*) defines the class and after must be an email, see example:

```
ftp> put 2016_BC0505_q2_A1__fzampirolli@gmail.com_GAB
ftp> put 2016_BC0505_q2_A1__fzampirolli@gmail.com.pdf
```

The MCTest program will send the processing of pages to this email. If you want to download the csv files generated, write **dir** to check that has been generated on the server vision and then:

```
ftp> get 2016_BC0505_q2_A1__fzampirolli@gmail.com.pdf.csv
```

There is a program runs every minute on server, looking files pdf which have not yet been processed (ie, if there is not a file with same name but with csv extension, containing the corrections).

As there are many *scanners*, with different qualities and resolutions, it is recommended to test this process with some tests before applying in a class with many students (I am available to help with anything you need).

If your goal is to just use the *createTexTests.py* in *shell* to create tex file with tests using csv files of classes and txt files of questions, skip the rest of the document.

Note

If any change is made in this file **createTexTexts.ipynb** and/or there is not file *createTexTests.py*, create it this notebook with *File->Download as-> Python (.py)*. For this, will have to install the **anaconda** (<http://continuum.io/downloads> (<http://continuum.io/downloads>)).

In [5]:

```
# -*- coding: utf-8 -*-

# part of the code presented in this document was inspired https://code.google.co

import random, sys, os, os.path, glob, csv, socket, string, smtplib

import numpy as np
import matplotlib.pyplot as plt
from unicodedata import normalize # retirar acentuação

# variáveis globais
if os.name == 'nt': # Windows
    barra = '\\'
else:
    barra = '/'

mypath = '.'+barra
mypathQuestions = mypath+'questions'+barra
mypathCourses = mypath+'courses'+barra
mypathTex = mypath+'tex'+barra
listextQuestions = ['*.txt']
listextCourses = ['*.csv']

letras_1 = ['A','B','C','D','E','F','G','H','I','J', 'K','L', 'M','N','O','P','Q'

def getQuestion(i, AllLines):
    tam = len(AllLines)
    while i < tam and AllLines[i][:3] not in ['QT:', 'QE:', 'QM:', 'QH:']: # acha un
        i += 1
    #if i == tam: return(i, ' ') # não achou questão
    tp = AllLines[i][:3]
    q = []
    q.append(AllLines[i])
    i += 1
    while i < tam and AllLines[i][:AllLines[i].find(':')] not in ['QT', 'QE', 'QM',
        q.append(AllLines[i])
        i += 1
```

```

if i<=tam and tp == 'QT:': # questao do tipo texto
    return (i, ' '.join([x for x in q]))
if i<tam and tp in ['QE:', 'QM:', 'QH:'] and AllLines[i][:2] in ['QT', 'QE:', 'QM',
    print 'ERRO: questão sem alternativas'
return (i, ' '.join([x for x in q]))

def getAnswer(i, AllLines):
    tam = len(AllLines)
    while i < tam and AllLines[i][:2] not in ['A:']: # acha uma questão
        i += 1
    #if i == tam: return(i, ' ') # não achou questão
    q = []
    q.append(AllLines[i])
    i += 1
    while i < tam and AllLines[i][:AllLines[i].find(':')] not in ['QT', 'QE', 'QM',
        q.append(AllLines[i])
        i += 1
    return (i, ' '.join([x for x in q]))

def questionsReadFiles(arquivos):
    # estados possiveis: fora de alguma questao
    # dentro de uma questao - 'QT', 'QE', 'QM', 'QH' - pergunta
    # dentro de uma questao - A - respostas
    # as questões são dos tipos QT (somente texto), QE (fácil), QM (média) ou QH
    # podendo ter subtipos, por exemplo, se tiver 5 questões, QE:a:, será escolhida
    # aleatória, somente uma questão do subtipo "a".
    # As questões QT, contendo apenas textos, serão inseridas no final do tex.

    listao = []
    respostas = []
    d = dict()
    argnum = 0
    questnum = 0
    questtotal = 0
    questions_file = 0

    for a in arquivos: # para cada arquivo de questões

        arq = open(a)
        AllLines = arq.readlines()

        tam = len(AllLines)
        i = 0
        while i<tam:
            i, q = getQuestion(i, AllLines)

            d = dict()

            d["t"] = ''
            vet = q.split('::')
            if len(vet)==2: #somente tipo
                d["t"] = vet[0] # tipo QT, QE, QM ou QH
                d["q"] = vet[1].strip()
                d["c"] = ''
                d["st"] = ''
            elif len(vet)==3: # com conteúdo abordado da questão

```



```

    elif len(vet)==3: # com conteúdo abreviado da questão
        d["t"] = vet[0]
        s = normalize('NFKD', vet[1].decode('utf-8')).encode('ASCII', 'ignore')
        d["c"] = s
        d["q"] = vet[2].strip()
        d["st"] = ''
    elif len(vet)==4: # subtipo da questão, um caracter qualquer
        d["t"] = vet[0] # tipo QT, QE, QM ou QH
        s = normalize('NFKD', vet[1].decode('utf-8')).encode('ASCII', 'ignore')
        d["c"] = s
        d["st"] = vet[2]
        d["q"] = vet[3].strip()

```

```

d["n"] = questnum
d["arq"] = arqnum

```

```

respostas = []
if d["t"] != "QT":
    contRespostas = 0
    while i < tam and AllLines[i][:AllLines[i].find(':')] in ['A']:
        i, r = getAnswer(i, AllLines)
        #if i == tam: break # não achou questão
        respostas.append(r[2:].strip())
        contRespostas += 1

```

```

    if contRespostas==0:
        print 'ERRO: questão sem respostas'
        sys.exit(-1)

```

```

d["a"] = respostas

```

```

listao.append(d)
questnum += 1

```

```

arq.close()
arqnum += 1
print "read the questions file: %-40s with %d questions" % (a, len(listao))
questions_file = len(listao)

```

```

print "\nTotal of questions without suptype:"
print "Easy questions QE: %d" % (len([y for y in listao if y['t'] == 'QE' and
print "Mean questions QM: %d" % (len([y for y in listao if y['t'] == 'QM' and
print "Hard questions QH: %d" % (len([y for y in listao if y['t'] == 'QH' and
print "Text questions QT: %d" % (len([y for y in listao if y['t'] == 'QT' and

```

```

print "\nTotal of questions with suptype:"
print "Easy questions QE: %d" % (len([y for y in listao if y['t'] == 'QE' and
print "Mean questions QM: %d" % (len([y for y in listao if y['t'] == 'QM' and
print "Hard questions QH: %d" % (len([y for y in listao if y['t'] == 'QH' and
print "Text questions QT: %d" % (len([y for y in listao if y['t'] == 'QT' and

```

```

return listao

```

```

def createListTypes(listao, tipo, numQ):
    questTipo = [y for y in listao if y['t'] == tipo and y['st']==''] # pega todas as questões do tipo
    st = [(y['st'], y['n']) for y in listao if y['t'] == tipo and y['st']!=''] # pega o subtipo e o número da questão
    if st:

```

```

stSet = list(set([i[0] for i in st])) # retira elementos repetidos
for i in stSet: # para cada subtipo, pego apenas UMA questão aleatoriamente
    li = [(y['st'],y['n']) for y in listao if y['t'] == tipo and y['st'] == i]
    escolhoUM = random.sample(li,1)
    ques = [y for y in listao if y['n'] == escolhoUM[0][1]]
    questTipo.append(ques[0])

```

```

if numQ > len(questTipo):
    print "number of available questions %s: \t %-5d" % (tipo, len(questTipo))
    print "\nERRO: number of solicitous questions is incompatible with the number of available questions"
    sys.exit(-1)

```

```

return questTipo

```

```

def createTests(listao, turmas):
    """ se a variável randomTests==0:
        significa que não serão geradas provas aleatórias, ou seja, esta função vai gerar
        as primeiras questões fáceis, médias e difíceis e não vai embaralhar as respostas.
        caberá ao professor gerar um arquivo *_GAB, fornecendo as soluções de cada questão.

    se a variável randomTests!=0:
        cada prova eh gerada aleatoriamente a partir da lista de tuplas com todas as questões.
        recebe como argumentos: uma listao de tuplas (q,a), o num de provas a ser geradas e o
        numero de questões cada prova deve ter.
        retorna as provas embaralhadas; as provas sao listas de tuplas (q,a,n,arq) onde q é a questão,
        a é a resposta correta, n é o numero de questões e arq é o gabarito.
        considerando que toda resposta correta esta na opcao A, posição 0, esta função também
        retorna os gabaritos, com as posições onde ficam a opção A após o embaralhamento de cada
        questão e de cada prova

    gabaritos = [Turma, matricula, gab, conteudos]
    provas     = [Turma, matricula, nome, questoes]]

    código adaptado de https://code.google.com/p/criaprova/downloads/list
    """

```

```

provas = []
questaoporprova = numQE + numQM + numQH + numQT
gabaritos = []

```

```

countTurma = 0
for t in turmas: # para cada turma

```

```

    for n in t: # para cada aluno da turma
        questoes = []

```

```

        questQE = createListTypes(listao,'QE',numQE) # tem que ficar aqui para gerar as questões aleatórias
        questQM = createListTypes(listao,'QM',numQM) # uma questão aleatória
        questQH = createListTypes(listao,'QH',numQH) # caso exista
        questQT = createListTypes(listao,'QT',numQT)

```

```

        if int(randomTests)!=0: #questões aleatórias
            quest = random.sample(questQE,numQE)
            quest.extend(random.sample(questQM,numQM))
            quest.extend(random.sample(questQH,numQH))
            quest.extend(random.sample(questQT,numQT))
        else: #questões sequenciais, com as primeiras questões fáceis, médias e difíceis
            quest = questOE[:numOE]

```

```

questoes.extend(questQM[:numQM])
questoes.extend(questQH[:numQM])
questoes.extend(questQT[:numQT])

indexQuest = []
for q in quest:
    indexQuest.append(listao.index(q))

c = [y['c'] for y in listao if y['c']!=''] # pega questões COM conteúdo
cSet = []
if c:
    for i in c:
        for j in i.split(' - '): # retira questão com mais de um conteúdo
            cSet.append(j)

conteudo = [] # cria uma lista de conteúdos
if len(cSet):
    cSet = sorted(list(set(cSet))) # retira conteúdos repetidos
    for i in cSet:
        conteudo.append([i,[]])

sequencia = []
gab = []
contQuest = 0
for q in quest:
    perg = q['q']
    contQuest += 1

    if q['c']: # questão tem conteúdo(s)
        ii=0
        for i in conteudo:
            #print ">>>",i[0],q['c']
            for j in q['c'].split(' - '):
                if i[0] == j:
                    #print ">",i[0],j
                    conteudo[ii][1].extend([contQuest])
            ii += 1

embaralhaResps = []
g = []
if q['t'] != 'QT': # não é uma questão dissertativa, embaralha respostas
    if int(randomTests)!=0: #questões aleatórias
        embaralhaResps = random.sample(q['a'],len(q['a']))
    else:
        embaralhaResps = q['a'][:len(q['a'])]

    g = embaralhaResps.index(q['a'][0])
    gab.append(g)

sequencia.append((perg,embaralhaResps,q['n'],q['arq'],g))
if q['t'] != 'QNI':
    pass

questoes.extend(sequencia)

if len(questoes) < questaoporprova:
    print "\n\n Prova %d com menos questoes do que o solicitado; algu"

```

```
    if int(randomTests)!=0: #questões aleatórias, então salva gabarito
        gabaritos.append([n[0], n[1], gab, indexQuest, conteudo])
```

```
    provas.append([n[0], n[1], n[2], questoes])
```

```
    countTurma = countTurma + 1
```

```
    return provas, gabaritos
```

```
def readQuestionsFiles(p):
    fileQuestoes = []
    listdirQuestoes = glob.os.listdir(mypathQuestions)
    listdirQuestoes.append('')
    for ext in listextQuestions:
        for file in np.sort(glob.glob(mypathQuestions+p+barra+ext)):
            fileQuestoes.append(file)
    return fileQuestoes
```

```
def readClassFiles(p):
    fileTurmas = []
    listdirTurmas = glob.os.listdir(mypathCourses)
    listdirTurmas.append('')
    for ext in listextCourses:
        for file in np.sort(glob.glob(mypathCourses+p+barra+ext)):
            fileTurmas.append(file)
    return fileTurmas
```

```
def classesReadFiles(files):
    print ""
    turmas = []
    for fi in files:
        alunos=[]
        with open(fi, 'rb') as f:
            reader = csv.reader(f, delimiter=';')
            for row in reader:
                #print ">>>", row
                s = normalize('NFKD', row[1].decode('utf-8')).encode('ASCII', 'ignore')
                alunos.append([fi,row[0],s])
        print "read the class file: %-40s with %d students" % (fi,len(alunos))
        turmas.append(alunos)
    print ""
    return turmas
```

```
def savesTemplates(gabaritos): # salva em disco todos os gabaritos num arquivo csv
    print ""
```

```
    if randomTests==0: #questões não aleatórias
        print "Warning: You chose in config.txt the option to generate non-random tests"
        print "In this case, if you want to use the automatic correction using MC"
        print "you must provide a file with the template or consider that the first"
        print "in pdf file is a template."
```

```
    else:
```

```
        files = []
        for g in gabaritos:
            files.append(g[0])
```

```
files.append(g[0])
```

```
for ff in sorted(set(files)):
```

```
    f = ff[:-4]+'__seuEmail@dominio.com_GAB'
```

```
    past = f[10:]
```

```
    filename = past[past.find(barra):]
```

```
    past = mypathTex+barra+past[:past.find(barra)]
```

```
    try:
```

```
        os.stat(past)
```

```
    except:
```

```
        os.mkdir(past)
```

```
    past += barra+folderQuestions
```

```
    try:
```

```
        os.stat(past)
```

```
    except:
```

```
        os.mkdir(past)
```

```
    f = past+filename
```

```
    print "aquivo salvo com os gabaritos da cada aluno da turma:",f
```

```
#[n[0], n[1], gab, indexQuest, conteudo]
```

```
with open(f, 'w') as csvfile:
```

```
    for gab in gabaritos:
```

```
        if ff is gab[0]:
```

```
            spamWriter = csv.writer(csvfile, delimiter=' ', quotechar=
```

```
            pathFile = gab[0]
```

```
            if os.name=='nt': #windows
```

```
                pathFile = pathFile.replace(barra, '/')
```

```
            s = ''.join([x for x in str(gab[2])] )
```

```
            s = s.strip('[')
```

```
            s = s.strip(']')
```

```
            s = s.replace(' ','')
```

```
            s = s.strip()
```

```
            i = ''.join([x for x in str(gab[3])] )
```

```
            i = i.strip('[')
```

```
            i = i.strip(']')
```

```
            i = i.replace(' ','')
```

```
            i = i.strip()
```

```
            t = ''.join([x for x in str(gab[4])] )
```

```
            spamWriter.writerow([pathFile, ';', gab[1], ';', s, ';',
```

```
def defineHeader(argprova, strTurma, idAluno, nomeAluno): # define o cabeçalho de ca
global instrucoes
```

```
if config['language'].replace('\n', '')=='portuguese':
```

```
    turma = "\\textbf{Turma:} %s\\n" % strTurma
```

```
    idAluno = "\\textbf{Matrícula:} %s\\n" % str(idAluno)
```

```
    nomeAluno = "\\textbf{Aluno:} %s\\n" % nomeAluno
```

```
    strAluno = "\\noindent"+nomeAluno+"\\hfill"+idAluno+"\\hfill"+turma+"\\hs
```

```
    ass = "\\noindent\\textbf{Ass:}\\rule{11.5cm}{0.1pt}\\hfill\\hspace{1cm}\\
```

```
    instrucoes = "Instru\\c c\\~oes: "
```

```

course = "Disciplina:"
teachers = "Professor(es):"
period = "Quadrimestre:"
modality = "Modalidade:"
date = "Data:"

```

```

if config['language'].replace('\n','')== 'english':
    turma = "\\textbf{Room:} %s\\n" % strTurma
    idAluno = "\\textbf{Registration:} %s\\n" % str(idAluno)
    nomeAluno = "\\textbf{Student:} %s\\n" % nomeAluno
    strAluno = "\\noindent"+nomeAluno+"\\hfill"+idAluno+"\\hfill"+turma+"\\hs
    ass = "\\noindent\\textbf{Sig.:}\\rule{11.5cm}{0.1pt}\\hfill\\hspace{1cm}
    instrucoes = "Instructions: "
    course = "Course:"
    teachers = "Teacher(s):"
    period = "Period:"
    modality = "Modality:"
    date = "Date:"

```

```

argprova.write("")
if duplexPrinting!=0:
    argprova.write("\\makeatletter\\renewcommand*\\cleardoublepage{\\ifodd\\c
    argprova.write("\\makeatother\\n")
    argprova.write("\\cleardoublepage\\n")

```

```

# header da página 1/2
argprova.write("\\begin{table}[h]\\centering\\n")
argprova.write("\\begin{tabular}{|p{16mm}|p{16cm}|}\\n\\hline")
argprova.write("\\multirow{4}{*}{\\hspace{-2mm}\\includegraphics[width=2cm]{..
argprova.write("&\\vspace{-2mm}\\noindent\\large\\textbf{"+config['title'].de
argprova.write("&\\noindent\\textbf{"+course+"} "+config['course'].decode('ut
argprova.write("&\\noindent\\textbf{"+teachers+"} "+config['teachers'].decode
argprova.write("&\\noindent\\textbf{"+period+"} "+config['period']+"\\hfill")
argprova.write("\\textbf{"+modality+"} "+config['modality']+"\\hfill")
argprova.write("\\textbf{"+date+"} "+config['date']+"\\hspace{-8mm}\\n\\hli
argprova.write("\\end{tabular}\\n")
argprova.write("\\end{table}\\n")
argprova.write("\\vspace{-4mm}\\small{\\n"+strAluno.decode('utf-8').encode("la
argprova.write("\\n\\vspace{8mm}\\n")
argprova.write(ass.decode('utf-8').encode("latin1"))
argprova.write("{}")

```

```

def createTexTests(provas): # salva em disco todos os testes em arquivos .tex
preambulol = ""
\\documentclass[10pt,brazil,a4paper]{exam}
\\usepackage[latin1]{inputenc}
\\usepackage[portuguese]{babel}
\\usepackage[dvips]{graphicx}
%\\usepackage{multicol}
%\\usepackage{shadow}
%\\usepackage{pifont}
%\\usepackage{listings}
%\\usepackage{fancyvrb}

```

```

\\newcommand*\\varhrulefill[1][0.4pt]{\\leavevmode\\leaders\\hrule height

```

```

\\def\\drawLines#1f{\\color{cyan}\\foreach \\x in {1,...,#1}{\\par\\vspace

```

```

\def\drawLines#1{\color{cyan}\foreach \x in {1,...,#1}{\par\vspace{1cm}\draw[red,thick] (0,0) -- (\x,0)}}
\usepackage{enumitem}
\usepackage{multirow}
\usepackage{amsmath}
\usepackage{changepage,ifthen}
%\usepackage{boxedminipage}
%\usepackage{theorem}
\usepackage{verbatim}
\usepackage{tabularx}
%\usepackage{moreverb}
\usepackage{times}
%\usepackage{relsize}
\usepackage{pst-barcode}
\usepackage{tikz}
\setlength{\textwidth}{185mm}
\setlength{\oddsidemargin}{-0.5in}
\setlength{\evensidemargin}{0in}
\setlength{\columnsep}{8mm}
\setlength{\topmargin}{-28mm}
\setlength{\textheight}{265mm}
\setlength{\itemsep}{0in}
\begin{document}
\pagestyle{empty}
%\lstset{language=python}
"""

```

```

files = []
for t in provas: # acha as turmas
    files.append(t[0])

for fff in sorted(set(files)): # para cada turma

    f = fff[:-4]+' .tex'

    past = f[10:]
    filename = past[past.find(barra):]
    past = mypathTex+barra+past[:past.find(barra)]
    try:
        os.stat(past)
    except:
        os.mkdir(past)

    past += barra+folderQuestions
    try:
        os.stat(past)
    except:
        os.mkdir(past)

    f = past+filename

    with open(f, 'w') as arqprova:

        print "latex file saved with the tests of all students of the class(e
        arqprova = open(f,'w')
        arqprova.write(preambulol1.decode('utf-8').encode("latin1"))

```

```

if False:
    arqprova.write("\\begin{center}\\n\\n")
    arqprova.write("\\resizebox{!}{5mm}{Provas criadas por}\\vspace{1cm}")
    arqprova.write("\\resizebox{!}{5mm}{createTexTests.py}\\vspace{1cm}")
    arqprova.write("\\resizebox{!}{5mm}{para o arquivo/turma:}\\vspace{1cm}")
    arqprova.write("\\resizebox{!}{5mm}{"+ filename[1:-4].replace('_', ' ') +"}")
    arqprova.write("\\resizebox{!}{5mm}{Guarde com segurança o arquivo}")
    arqprova.write("\\resizebox{!}{5mm}{"+ filename[1:-4].replace('_', ' ') +"}")
    arqprova.write("\\resizebox{!}{5mm}{Este arquivo contem os gabaritos}")
    arqprova.write("\\resizebox{!}{5mm}{individuais de cada teste!!!}")
    arqprova.write("\\resizebox{!}{7mm}{\\'E \\'unico toda vez que gerar}")
    arqprova.write("\\end{center}\\n\\n")
    arqprova.write("\\newpage\\thispagestyle{empty}\\mbox{}\\newpage\\")

```

```

for t in provas:
    if fff is t[0]: # se prova é da mesma turma, acrescente
        ff = t[0]
        ff = ff[:-4]
        strTurma = ff[len(ff)-ff[::-1].find(barra):]
        strTurma = strTurma.replace("_", "$\\_$")

    ##### Padroes dos quadros de respostas #####

    numQuestoes = len(t[3])-numQT # somente questões de múltipla escolha
    numRespostas = len(t[3][0][1])

    if numQuestoes>0:

        let = letras_1[0:numRespostas]
        strResps = (',').join([(let[x]+'/' + str(x+1)) for x in range(numRespostas)])

        # questões por quadro
        numQuadros = numQuestoes/maxQuestQuadro
        numResto = numQuestoes % maxQuestQuadro
        if numResto:
            numQuadros+=1
        if numQuadros==0:
            numQuadros+=1

        maxQuadrosHoz = int(config['maxQuadrosHoz'])

        if numQuestoes/maxQuestQuadro < maxQuadrosHoz:
            maxQuadrosHoz = int(numQuestoes/maxQuestQuadro)

        numQuadrosHoz = numQuadros
        if maxQuadrosHoz<numQuadros:
            numQuadrosHoz = maxQuadrosHoz

        numQuestoesQuadro = maxQuestQuadro
        if numQuestoes < maxQuestQuadro:
            numQuestoesQuadro = numQuestoes
        QL=1
        if maxQuadrosHoz:
            QL = numQuadros/maxQuadrosHoz # quadros por linha
            QC = numQuadrosHoz # quadros por coluna
            if QC==0:

```



```

if QC==0:
    QC=1
fimQuadro_ij = np.zeros([QL,QC])
contadorQuestoes = 0
for j in range(QC):
    for i in range(QL):
        contadorQuestoes += numQuestoesQuadro
        fimQuadro_ij[i][j] = contadorQuestoes
if numQuestoes > maxQuestQuadro:
    fimQuadro_ij[QL-1][QC-1] += numResto

numQuestStart = numQuestEnd = 0

if int(MCTest_sheets)!=1: # foi escolhido a opção de gerar sc

##### pagina de resposta - Parte 1 #####

defineHeader(arqprova,strTurma,t[1],t[2]) # cabeçalho da

arqprova.write("\\begin{pspicture}(6,0in)\\n")
arqprova.write("\\psbarcode[scalex=1.6,scaley=0.35]{%s}{%s}" % (t[1],t[2]))
arqprova.write("\\end{pspicture}\\n")

if (config['instructions1']!="\\n"):
    arqprova.write("\\\\{\\scriptsize\\n\\n\\noindent\\text
    arqprova.write(config['instructions1'].decode('utf-8')
    arqprova.write("\\end{verbatim}\\n")

if (config['titPart1']!="\\n"):
    arqprova.write("\\begin{center}\\textbf{"+config['tit
    arqprova.write("\\vspace{-5mm}\\noindent\\varhrulefill[0.
    arqprova.write("\\vspace{-3mm}\\noindent\\varhrulefill[0.

#print numQuestoes,numQuadros,numQuestoesQuadro, numResto
arqprova.write("\\begin{center}\\n")

for i in range(QL): # para cada linha de quadros
    for j in range(QC): # para cada coluna de quadros

        if fimQuadro_ij[i][j] == numQuestoes: # para o úl
            numQuestStart = int(fimQuadro_ij[i][j] - numQ
        else:
            numQuestStart = int(fimQuadro_ij[i][j] - numQ

    numQuestEnd = int(fimQuadro_ij[i][j])
    #print "quadro",i,j, numQuestStart, numQuestEnd

    arqprova.write("\\begin{tikzpicture}[font=\\tiny]
    arqprova.write("    \\foreach \\letter/\\position i
    arqprova.write("        \\node[inner sep=3pt] at ({\\
    arqprova.write("    }\\n")
    arqprova.write("    \\foreach \\line in {%s,...,%s}
    arqprova.write("        \\begin{scope}[xshift=0cm,ys
    arqprova.write("            \\foreach \\letter/\\posit
    #arqprova.write("                \\node[draw,fill,gray
    arqprova.write("                \\node at (-0.1,0) {\\

```

```

        argprova.write("                \\node[fill=black!30,d
        argprova.write("                \\node[fill=white,draw
        argprova.write("                }\n")
        argprova.write("        \\end{scope}\n")
        argprova.write("    }\n")
        argprova.write("\\end{tikzpicture}\\hspace{%s cm}
argprova.write("\n\n")

argprova.write("\\end{center}\n")
saltaLinhas = max(0,15-numQuestoesQuadro/2)

#argprova.write("\\vspace{%s cm}\\noindent\\hrulefill\n\n")

argprova.write("\\vspace{1cm}\\noindent\\varhrulefill[0.4
argprova.write("\\vspace{-3mm}\\noindent\\varhrulefill[0.

argprova.write(config['endTable'].decode('utf-8').encode(

argprova.write("\\newpage")
if duplexPrinting!=0:
    argprova.write("\\thispagestyle{empty}\\mbox{\\n \\ \\

if int(MCTest_sheets)!=0: # foi escolhido a opção de gerar sc

##### pagina de questoes - Parte 2 #####

if numQuestoes>0:
    defineHeader(argprova,strTurma,t[1],t[2]) # cabeçalho
    argprova.write("\n\\vspace{4mm}\n")

    if (config['instructions2']!="\n"):
        argprova.write("\\\\{\\scriptsize\n\n\\noindent\\
        argprova.write(config['instructions2'].decode('ut
        argprova.write("\\end{verbatim}\n")

    if (config['titPart2']!="\n"):
        argprova.write("\\begin{center}\\textbf{"+config[

argprova.write("{\\small\n")
argprova.write("\\begin{questions}\n")
argprova.write("\\itemsep0pt\\parskip0pt\\parsep0pt\n")
for q in t[3]: # questões
    if q[1]:
        qstr = q[0]
        #print ">>>",qstr
        argprova.write("\\question %s\n" % qstr.decode
        argprova.write("\\begin{choices}\n") #oneparc
        argprova.write("\\itemsep0pt\\parskip0pt\\par
        for r in q[1]: # respostas
            #print ">>",r
            argprova.write("\\choice %s\n" % r.decode
        argprova.write("\\end{choices}\n")
argprova.write("\\end{questions}\n")
argprova.write("}")
argprova.write("\n \\ \\ \\ \\n \\newpage\n")

```

```

        if numQT>0:
            ##### questoes dissertativas - Parte 3
            if headerByQuestion!=1: # =1, um cabeçalho por questão
                defineHeader(arqprova,strTurma,t[1],t[2]) # cabeçalho
                arqprova.write("\n\\vspace{4mm}\n")

            if config['titPart3']!="\n":
                arqprova.write("\\begin{center}\\textbf{"+config['titPart3']+"}\n")

            arqprova.write("{\\small\n")
            #arqprova.write("\\begin{questions}\n")
            #arqprova.write("\\itemsep0pt\\parskip0pt\\parsep0pt\n")
            for q in sorted(t[3]): # questões
                if q[1]==[]:
                    if headerByQuestion==1: # um cabeçalho na página
                        defineHeader(arqprova,strTurma,t[1],t[2])
                        arqprova.write("\n\n\\vspace{4mm}")
                    arqprova.write("\\noindent %s \n\n" % q[0].descricao)
                    arqprova.write("\n \\\\ \n \\newpage\n")
                    #arqprova.write("\\question %s\n" % q[0].descricao)
            #arqprova.write("\\end{questions}\n")
            arqprova.write("}\n")

        arqprova.write("\\end{document}")
        arqprova.close() # final do arquivo

def createTex2PDF(provas):
    files = []
    for t in provas: # acha as turmas
        files.append(t[0])
    for fff in sorted(set(files)): # para cada turma
        f = fff[:-4]+'.tex'
        past = f[10:]
        arq = past[past.find(barra):]
        past = mypathTex+past[:past.find(barra)]
        past += barra+folderQuestions
        f = past+arq
        p = os.getcwd()
        os.chdir(p+past[1:])
        os.system('cd '+f[len(past)+1:])
        os.system('latex '+f[len(past)+1:])
        if os.name == 'nt': # Windows
            os.system('dvips -P pdf '+f[len(past)+1:].dvi')
            os.system('ps2pdf '+f[len(past)+1:].ps')
            os.system('del *.aux *.dvi *.aux *.log *.ps')
        else:
            os.system('dvi2pdf '+f[len(past)+1:].dvi')
            os.system('rm *.aux *.dvi *.aux *.log')
        os.chdir(p)

def getConfigLines(i, AllLines):
    tam = len(AllLines)
    while i < tam and AllLines[i]!='\n' and len(AllLines[i].split('::'))<2: # achou
        i += 1
    v = AllLines[i].split('::')

```

```

s = []
v0 = v[0]
v0 = v0.replace(' ','')
v0 = v0.replace('\t','')
ss = v[1]
ss = ss.lstrip()
ss = ss.rstrip()
ss = ss.replace('\t','')
s.append(ss)
i += 1
while i < tam and len(AllLines[i].split('::'))<2:
    ss = AllLines[i]
    ss = ss.lstrip()
    ss = ss.rstrip()
    ss = ss.replace('\t','')
    s.append(ss)
    i += 1
return (i,v0,'\n'.join([x for x in s]))

```

```

def getConfig(file):
    global config, folderQuestions, folderCourse, randomTests, barra, MCTest_shee
    global numQE, numQM, numQH, numQT, duplexPrinting, maxQuestQuadro, maxQuadros
    global template

    arq = open(file)
    AllLines = arq.readlines()
    tam = len(AllLines)
    i = 0
    config = dict()
    while i<tam:
        i, v, s = getConfigLines(i, AllLines)
        config[v] = s

    numQE = int(config['numQE']) # num. questoes fáceis
    numQM = int(config['numQM']) # num. questoes médias
    numQH = int(config['numQH']) # num. questoes difíceis
    numQT = int(config['numQT']) # num. questoes dissertativas
    folderQuestions = config['folderQuestions'] # pasta com o bd de questões
    folderCourse = config['folderCourse']
    randomTests = int(config['randomTests'])
    MCTest_sheets = int(config['MCTest_sheets'])
    duplexPrinting = int(config['duplexPrinting'])
    template = int(config['template'])
    maxQuestQuadro = int(config['maxQuestQuadro'])
    maxQuadrosHoz = int(config['maxQuadrosHoz'])
    headerByQuestion = int(config['headerByQuestion'])

```

```

def main():
    global turmas, gabaritos, randomTests, barra, MCTest_sheets, folderQuestions,
    global numQE, numQM, numQH, numQT, duplexPrinting, maxQuestQuadro, maxQuadros
    global config

    try:
        if len(sys.argv)==2:
            getConfig(sys.argv[1]) # ler as variáveis de configuração e layout

            turmas = classesReadFiles(readClassFiles(folderCourse))

```

```

    provas=[]
    gabaritos=[]
    listao = questionsReadFiles(readQuestionsFiles(folderQuestions))
    provas, gabaritos = createTests(listao, turmas)
    createTexTests(provas)
    if template!=0:
        savesTemplates(gabaritos)
    createTex2PDF(provas)

except ValueError:
    print "Oops!  Erro in File:",sys.argv[1], "Try again..."

if __name__ == '__main__':
    main()

```

To test this code anaconda:

Read the settings file:

In [6]:

```
getConfig('config.txt')
```

Read the files of students classes:

In [7]:

```
classes = classesReadFiles(readClassFiles(folderCourse))
```

```

read the class file: ./courses/course2016q2/2016_BC0505_q2_A2.csv wi
th 2 students
read the class file: ./courses/course2016q2/2016_BC0505_q2_A3.csv wi
th 3 students

```

Read the questions files:

In [8]:

```
tests=[]  
templates=[]  
lists = questionsReadFiles(readQuestionsFiles(folderQuestions))
```

```
read the questions file: ./questions/testp1/questions1.txt      wi  
th 8 questions  
read the questions file: ./questions/testp1/questions2.txt      wi  
th 9 questions  
read the questions file: ./questions/testp1/questionsText.txt   wi  
th 5 questions
```

Total of questions without suptype:

```
Easy questions QE: 4  
Mean questions QM: 4  
Hard questions QH: 5  
Text questions QT: 1
```

Total of questions with suptype:

```
Easy questions QE: 4  
Mean questions QM: 0  
Hard questions QH: 0  
Text questions QT: 4
```

Create the tex files with tests:

In [9]:

```
tests, templates = createTests(lists, classes)  
createTexTests(tests)
```

```
latex file saved with the tests of all students of the class(es): ./  
tex//course2016q2/testp1/2016_BC0505_q2_A2.tex  
latex file saved with the tests of all students of the class(es): ./  
tex//course2016q2/testp1/2016_BC0505_q2_A3.tex
```

Save the file with the templates:

In [10]:

```
if template!=0:  
    savesTemplates(templates)
```

```
aquivo salvo com os gabaritos da cada aluno da turma: ./tex//course2  
016q2/testp1/2016_BC0505_q2_A2__seuEmail@dominio.com_GAB  
aquivo salvo com os gabaritos da cada aluno da turma: ./tex//course2  
016q2/testp1/2016_BC0505_q2_A3__seuEmail@dominio.com_GAB
```

Compile the files tex generating the files pdf:

In [11]:

```
createTex2PDF(tests)
```

See the tests generated in `MCTest4/tex/course2016q2/testp1/`