Practice Exam: Programming I (AE1106Python)
Date: Tuesday January 10th, 2012 , 14.30-17:30 hr

Part I: Reading Python (24 pts)

1. What will be printed by the following program?

```
i=0
flag=0
stop=False
while not stop:
    i=i+1
    if i%7==0:
        flag=flag+1
        if flag==2:
            stop=True
print i
```

2. What will be printed by the following program?

```
N = 4
Arr = []

for i in range(N):
    for j in range(N):
        if i==0 or j==0 or i==N-1 or j==N-1:
            Arr.append((i,j))
print Arr
```

3. What will be printed by the following program?

```
i=0
a=0
while a<=1:
    i=i+1
    a=i/10
print i
```

4. What will be printed in the shell if you call for *function(' hallo world')*?

```
def function(two_words):

    first = two_words[:two_words.find(' ')]
    second = two_words[two_words.find(' ') + 1:]
    print(second + ' ' + first)
```

5. What will be printed by the following program?

```
import numpy as np
v = np.arange(0,25,1)
i = 0
while i<=20:
    if np.sqrt(v[i])>3 and v[i]<22:
        print v[i]
    i=i+1
```

6. This starting programmer has made a bit of a mess of the variable names. What will the program print?

```
def f(n,a):
    if n%a==0:
        n=n/a
    else:
        n = n%a
    return a,n

n = 120
a = 10

n,a = f(a,n)

print a,n
```

Part II Debugging Python: multiple choice (12 pts)

7. Which statement is true about the following program?

```
condition=True
a=0

for i in range(10):
    for j in range(i):

        if not condition:
            a=a+1

print a,condition
```

A) This program contains a syntax error and will not work
B) This program contains an indentation error and will not work
C) This program will run and will print '0 True'
D) This program will run and will print '10 False'
E) This program will run and will print '36 True'
F) This program will run and will print '36 False'
G) This program will run and will print '45 True'
H) This program will run and will print '45 False'
I) This program will give a runtime error

8. Which statement is true about the following program?

```
a = raw_input('Enter a value:')

    if a%2==0 and a>1:

        print 'You entered an even number'

    else:
        print 'You entered an odd number'
```

A) This program is entirely correct
B) This program contains a syntax/indentation error
C) This program will give a runtime error
D) This program contains both a runtime and syntax/indentation error

9. A student wishes to simulate an object moving under constant force. He/she would like to run the simulation for different masses of the object: 5,10,20,40 and 60 kg. To find the response for the different masses he/she uses a for-loop. For each mass, the first three seconds of the response are computed and stored in a list. Which statement is true about his/her program:

```
# Define initial conditions

t  = 0
dt = 0.01
vx = [0.,0.,0.,0.,0.]
vy = [0.,0.,0.,0.,0.]
Fx = 100.
Fy = 100.
m = [5,10,20,40,60] # kg
x = [4,7,1,-2,0]
y = [0,4,-1,2,3]
xtab = []
ytab = []

#Do simulation for all masses
j = -1
for i in m:
    j = j + 1

# while running

    while t<3:

        t  = t + dt
        ax = Fx/i
        ay = Fy/i

        vx[j] = vx[j] + ax*dt
        vy[j] = vy[j] + ay*dt
        x[j]  = x[j] + vx[j]*dt
        y[j]  = y[j] + vy[j]*dt

        xtab.append(x[j])
        ytab.append(y[j])
```

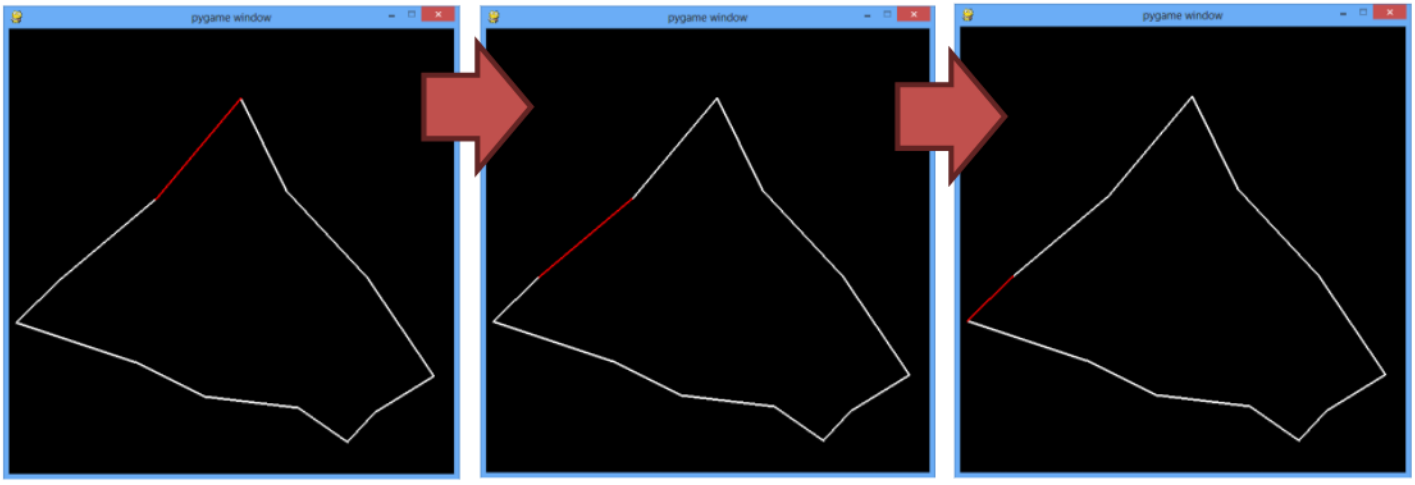
A) This program is erroneous, because it is not initialized
B) The while loop will only run for the first mass of 5 kg
C) This program does not work, because a variable is not recognized
D) This program contains syntax and indentation errors and will not work
E) This program will give a runtime error
F) This program will contains an infinite loop and will keep on running forever

```
dt = 0.1
tstart = 0.001*pg.time.get_ticks()
tsim = tstart
LNr = 0   #Number of line segment that will be drawn in red.

running = True
while running:
   trun = 0.001*pg.time.get_ticks()-tstart
   if _____(d)_____: #Only once every 'dt'.
      tsim = tsim+dt

      scr.fill(black)
      pg.draw.lines(scr, white, False, coords, 3)
      pg.draw.lines(scr,red,False,[coords[LNr],coords[LNr+1]],3)
      if LNr+1 < _____(e)_____: # Start over and repeat
         LNr = LNr+1
      else:
         LNr = 0

      pg.display.flip()


   pg.event.pump()
   keys = pg.key.get_pressed()
   if keys[pg.K_ESCAPE]:
      running = False
   for event in pg.event.get():
      if event.type == pg.QUIT: # Close window selected
          _____(f)_____

pg.quit()
```

Give what should be entered at the positions marked with (a), (b), (c), (d), (e) and (f) to make this program work in a correct way.

Part III Supplement Python (24 pts)

10. In this script a file is read to find coordinates. These coordinates are connected by white line segments to draw a figure using pygame. There is also one line segment that is drawn in red. Every 0.1 seconds the next line segment is painted red, simulating a red line traveling along the white lines. See the figure for the required result.
The data file contains coordinates ranging from -1 to 1 in both x and y direction. These also have to be transformed to the resolution of the window.
The text file is also provided right next to the code.




```
import pygame as pg

pg.init()


xmax = 600
ymax = 600

reso = (xmax,ymax)
scr = pg.display.set_mode(reso)

black = (0,0,0)
white = (255,255,255)
red = (255,0,0)


f = open('coordinates.dat')
lines = f.readlines()
coords = []
for l in lines:
   if _____(a)_____ and not l.strip() == "": #Only use correct
lines.
      line = l._____(b)_____ #Clean line (split and/or strip).
      x = float(line[0])*xmax/2.+xmax/2.
      y = float(line[1])*_____(c)_____
      coords.append((x,y))
f.close()
```

```
# x, y

0.523, 0.857
0.653, 0.719
0.907, 0.561
0.612, 0.123
0.245,-0.273
0.043, -0.689
-0.341, -0.231
-0.762, 0.121
-0.967, 0.323
-0.432, 0.498
-0.120, 0.656
0.294, 0.702
0.523, 0.857
```