

Assignment 1 Solutions

1. stage_of_life is taken as a separate variable which is storing the print value based on the age condition so that only one print statement at the end is used. Also, the nesting of if statements is avoided by breaking it into if-elif-else ladder for increasing the performance.

```
age=12
if age < 12:
    stage_of_life = 'kid'
elif 12<=age<18:
    stage_of_life = 'teenager'
else:
    stage_of_life = 'adult'

print(stage_of_life) # only one print statement in code
```

2. In the given code snippet, parenthesis is not missing as *, / have same precedence and are evaluated from left to right. So appropriate parenthesis is placed in the expression for the correctness of the below.

```
from math import sqrt
a = 4
b = -12
c = 9
q_sr = sqrt(b*b - 4*a*c)
x1 = (-b + q_sr)/(2*a)
x2 = (-b - q_sr)/(2*a)
print(x1, x2)
```

3. Here the rectangles are considered to be parallel to the x and y axis. Three conditions are checked: - Completely Inside (Enclosed), Partial Overlap, Complete Overlap and Intersection. The top and bottom (x, y) coordinates of the yellow and blue rectangle is checked accordingly.

```
a=float(input())
b=float(input())
e=float(input())
f=float(input())
c=float(input())
d=float(input())
g=float(input())
h=float(input())
isEnclosed=False
isCompleteOverlap=False
isPartialOverlap=False
isIntersect=False

if a<c and g<e and b<d and h<f:
    isEnclosed=True
elif a==c and g==e and b==d and h==f:
    isCompleteOverlap=True
elif (a==c or b==d) and g<=e and h<=f:
    isPartialOverlap=True
elif (g==e or h==f) and a<=c and b<=d:
    isPartialOverlap=True
elif a<=c and g>=e and b<=d and h>=f:
    isIntersect=True
elif c<=a and g<=e and b>=d and h<=f:
    isIntersect=True
else:
    isEnclosed=False

if isEnclosed:
    print("Blue Rectangle is enclosed inside Yellow Rectangle")

elif isCompleteOverlap:
    print("Blue Rectangle completely overlaps Yellow Rectangle")

elif isPartialOverlap:
    print("Blue Rectangle partially overlaps Yellow Rectangle")

elif isIntersect:
    print("Blue Rectangle and Yellow Rectangle intersect each other")

else:
    print("Blue Rectangle is not enclosed inside Yellow Rectangle")
```

4. For the given two circles with centers C1, C2 and radius r1, r2 the condition used to check whether the circles intersect $|(r1-r2)| < C1C2 < r1+r2$ and other scenarios where the circles touch each other(externally/internally), circle inside another circle and concentric circles are checked.

```
from math import sqrt

x1=float(input())
y1=float(input())
x2=float(input())
y2=float(input())
r1=float(input())
r2=float(input())
distsq=(x1-x2)*(x1-x2)+(y1-y2)*(y1-y2)
dist=sqrt(distsq)
radsq=(r1+r2)*(r1+r2)

if (r2-r1)*(r2-r1)<distsq<radsq:
    print("The two circles intersect each other")

elif dist==0:
    print("The two circles are concentric")

elif distsq==radsq:
    print("The two circles touch each other externally")

elif distsq==(r2-r1)*(r2-r1):
    print("The two circles touch each other internally")

elif r1+dist<r2:
    print("The first circle lies inside the second circle")

elif r2+dist<r1:
    print("The second circle lies inside the first circle")

else:
    print("The two circles do not intersect each other")
```