Industrial Software Development (ISDe) – February 1, 2021

Name: ..... Surname: ..... Student ID: .....

EXERCISE 2 (10 points) - 30 minutes

We consider a game with gnomes and orcs. Both **Gnome** and **Orc** are subclasses of **Character**. At creation, each gnome has an initial energy of 100, while each orc has an initial energy of 200. Both increase their energy by the amount **x** using the **.eat(x)** method.

a) Implement the classes, trying to concentrate the common code in the superclass.

EXAMPLE

```
# Use exactly this 'MAIN'
# This code must run correctly, producing the showed output.

orc1 = Orc()
orc2 = Orc()

gnome1 = Gnome()
gnome2 = Gnome()

print('orc1 energy:', orc1.energy)
print('orc2 energy:', orc2.energy)
print('gnome1 energy:', gnome1.energy)
print('gnome2 energy:', gnome2.energy)

print('gnome1 eats 10')
gnome1.eat(10)

print('gnome1 energy:', gnome1.energy)
```

The output is:

```
orc1 energy: 200
orc2 energy: 200
gnome1 energy: 100
gnome2 energy: 100
gnome1 eats 10
gnome1 energy: 110
```

b) When an orc attacks an orc, they both lose 10 energy points. When a gnome attacks a gnome, they both lose 7 points of energy. When an orc attacks a gnome, the gnome loses 5 points and the orc 1 point. When a gnome attacks an orc, the orc loses 3 points and the gnome 2 points.

Use the **double-dispatch** mechanism (so, no IF conditional structure) to implement this behavior.

EXAMPLE

```
# Use exactly this 'MAIN'
# This code must run correctly, producing the showed output.
orc1 = Orc()
orc2 = Orc()
gnome1 = Gnome()
gnome2 = Gnome()

## ATTACK
print('\n \n')
print('\nWhen an orc attacks an orc, they both lose 10 energy points.')
print('orc1 energy:', orc1.energy, '-  orc2 energy:', orc2.energy)
print('ATTACK!')
orc1.attack(orc2)
print('orc1 energy:', orc1.energy, '-  orc2 energy:', orc2.energy)

print('\nWhen a gnome attacks a gnome, they both lose 7 points of energy.')
print('gnome1 energy:', gnome1.energy, '-   gnome2 energy:', gnome2.energy)
print('ATTACK!')
gnome1.attack(gnome2)
print('gnome1 energy:', gnome1.energy, '-   gnome2 energy:', gnome2.energy)

print('\nWhen an orc attacks a gnome, the gnome loses 5 points and the orc 1
point.')
print('gnome1 energy:', gnome1.energy, '-   orc1 energy:', orc1.energy)
print('ATTACK!')
orc1.attack(gnome1)
print('gnome1 energy:', gnome1.energy, '-  orc1 energy:', orc1.energy)

print('\nWhen a gnome attacks an orc, the orc loses 3 points and the gnome 2
points.')
print('gnome1 energy:', gnome1.energy, '-   orc1 energy:', orc1.energy)
print('ATTACK!')
gnome1.attack(orc1)
print('gnome1 energy:', gnome1.energy, '-   orc1 energy:', orc1.energy)
```

The output is:

```
When an orc attacks an orc, they both lose 10 energy points.
orc1 energy: 200 -  orc2 energy: 200
ATTACK!
orc1 energy: 190 -  orc2 energy: 190

When a gnome attacks a gnome, they both lose 7 points of energy.
gnome1 energy: 100 -   gnome2 energy: 100
ATTACK!
gnome1 energy: 93 -   gnome2 energy: 93

When an orc attacks a gnome, the gnome loses 5 points and the orc 1 point.
gnome1 energy: 93 -   orc1 energy: 190
ATTACK!
gnome1 energy: 88 -  orc1 energy: 189

When a gnome attacks an orc, the orc loses 3 points and the gnome 2 points.
gnome1 energy: 88 -   orc1 energy: 189
ATTACK!
gnome1 energy: 86 -   orc1 energy: 186
```