Homework #11

01286121 Computer Programming

Software Engineering Program,

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By

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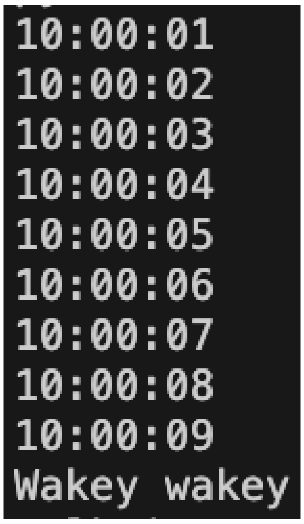
1.

Code:

```
import time

class Clock:
    def __init__ (self, hh, mm, ss):
        self.hh = hh
        self.mm = mm
        self.ss = ss

    def run(self):
        while True:
            self.ss += 1
            if self.ss >= 60:
                self.ss = 0
                self.mm += 1

            if self.mm >= 60:
                self.mm = 0
                self.hh += 1

            if self.hh >= 24:
                self.hh = 0

            time.sleep(1)
            print(f"{self.hh:02}:{self.mm:02}:{self.ss:02}")

    def setTime(self, hh, mm, ss):
        self.hh = hh
        self.mm = mm
        self.ss = ss

class AlarmClock(Clock):
    def __init__(self, hh, mm, ss, alarm_hh, alarm_mm, alarm_ss, alarm_on_off):
        super().__init__(hh, mm, ss)
        self.alarm_hh = alarm_hh
        self.alarm_mm = alarm_mm
        self.alarm_ss = alarm_ss
        self.alarm_on_off = alarm_on_off

    def setAlarmTime(self, h, m, s):
        self.alarm_hh = h
        self.alarm_mm = m
        self.alarm_ss = s

    def alarm_on(self):
        self.alarm_on_off = True

    def alarm_off(self):
        self.alarm_on_off = False

    def run(self):
        while True:
            self.ss += 1
            if self.ss >= 60:
                self.ss = 0
                self.mm += 1

            if self.mm >= 60:
                self.mm = 0
                self.hh += 1

            if self.hh >= 24:
                self.hh = 0

            if self.hh == self.alarm_hh and self.mm == self.alarm_mm and self.ss == self.alarm_ss and
self.alarm_on_off == True:
                return print("Wakey wakey")

            time.sleep(1)
            print(f"{self.hh:02}:{self.mm:02}:{self.ss:02}")

c1 = AlarmClock(10, 00, 00, 10, 0, 10, True)
c1.run()
```

Result:



```
10:00:01
10:00:02
10:00:03
10:00:04
10:00:05
10:00:06
10:00:07
10:00:08
10:00:09
Wakey wakey
```

2.

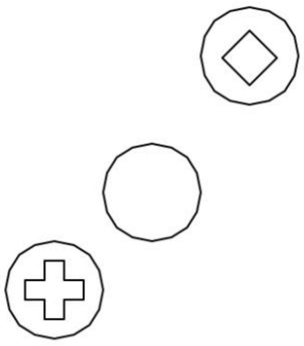
Code:

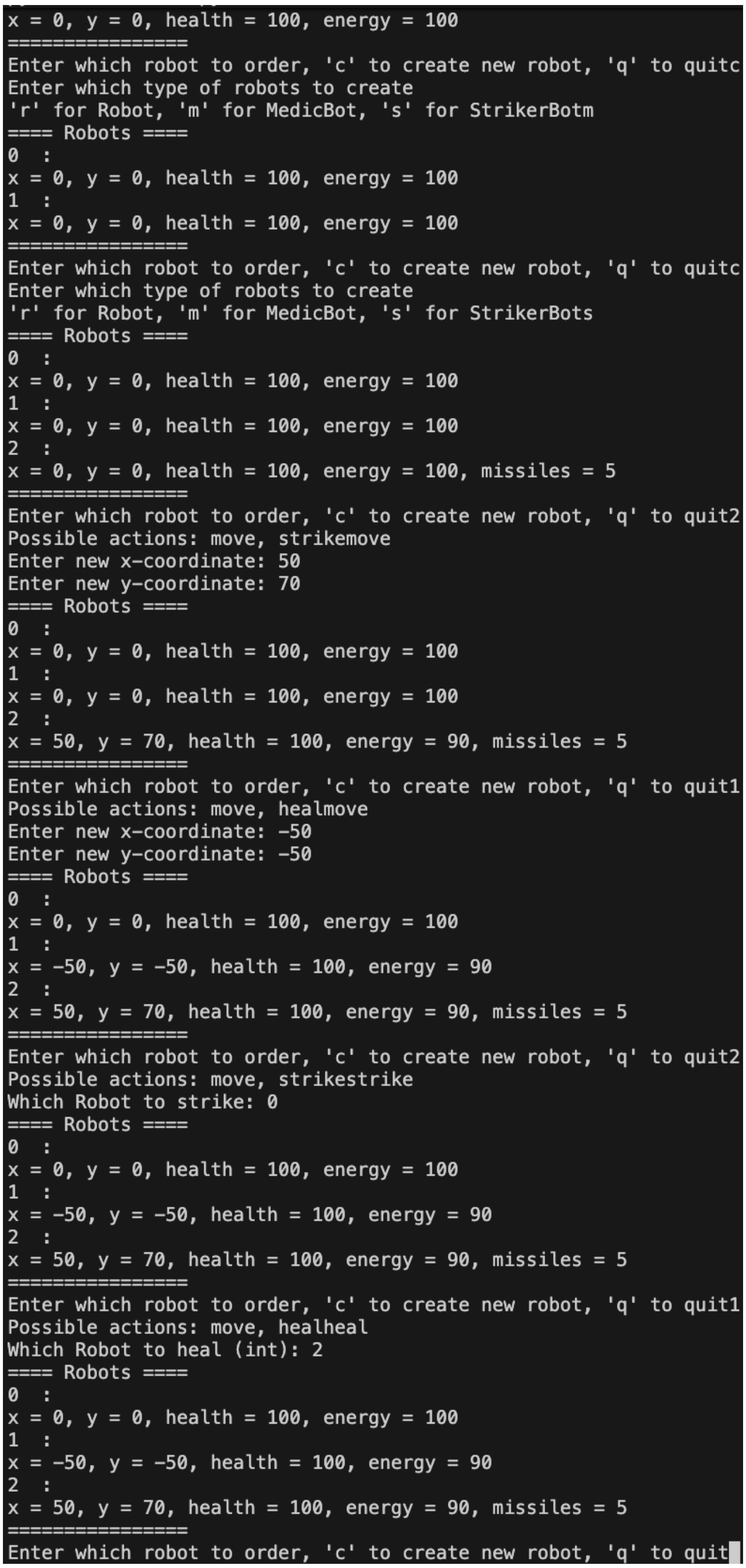
```
import turtle

def RobotBattle():
    robotList = []

    while True:
        turtle.clear()
        for robot in robotList:
            robot.draw()

        print("==== Robots ====")

        i = 0
        for robot in robotList:
            print(i, " : ")
            robot.displayStatus()
            i += 1
        print("===============")

        choice = input("Enter which robot to order, 'c' to create new robot, 'q' to quit")
```

```python
        if choice == "q":
            break
        elif choice == "c":
            print("Enter which type of robots to create")
            robotType = input("'r' for Robot, 'm' for MedicBot, 's' for StrikerBot")
            if robotType == "r":
                newRobot = Robot()
            elif robotType == "m":
                newRobot = MedicBot()
            elif robotType == "s":
                newRobot = StrikerBot()
            robotList = robotList + [newRobot]
        else:
            n = int(choice)
            robotList[n].command(robotList)

        i = 0
        for robot in robotList:
            if robot.health <= 0:
                del robotList[i]
            i += 1

class Robot(object):
    def __init__(self):
        self.x = 0
        self.y = 0
        self.health = 100
        self.energy = 100

    def move(self, x, y):
        if self.energy > 0:
            self.x = x
            self.y = y
            self.energy -= 10

    def draw(self):
        turtle.showturtle()
        turtle.pu()
        turtle.goto(self.x, self.y)
        turtle.setheading(0)
        turtle.pd()
        turtle.circle(25)
        turtle.hideturtle()

    def displayStatus(self):
        print(f"x = {self.x}, y = {self.y}, health = {self.health}, energy = {self.energy}")

    def command(self, robotList):
        print("Possible actions: move")
        newX = int(input("Enter new x-coordinate: "))
        newY = int(input("Enter new y-coordinate: "))
        self.move(newX, newY)

class MedicBot(Robot):
    def __init__(self):
        super().__init__()

    def heal(self, r):
        if self.energy >= 20 and self.x + 20 >= r.x and self.y + 20 >= r.x and self.x - 20 <= r.x and self.y - 20 <= r.y:
            self.energy -= 20
            r.health += 10

    def draw(self):
        turtle.showturtle()
        turtle.pu()
        turtle.goto(self.x, self.y)
        turtle.setheading(0)
        turtle.pd()
        turtle.circle(25)

        turtle.left(90)
        turtle.pu()
        turtle.forward(10)
        turtle.right(90)
        turtle.forward(5)
        turtle.left(90)
        turtle.pd()
        turtle.forward(10)
        for i in range(0, 4):
            turtle.right(90)
```

```python
            turtle.forward(10)
            turtle.left(90)
            turtle.forward(10)
            turtle.left(90)
            turtle.forward(10)

        turtle.hideturtle()

    def command(self, robotList):
        asking = True
        while asking:
            choice = input("Possible actions: move, heal")
            if choice == "move":
                newX = int(input("Enter new x-coordinate: "))
                newY = int(input("Enter new y-coordinate: "))
                self.move(newX, newY)
                asking = False
            elif choice == "heal":
                toHeal = int(input("Which Robot to heal (int): "))
                if len(robotList) >= toHeal:
                    self.heal(robotList[toHeal])
                    asking = False


class StrikerBot(Robot):
    def __init__(self, missile = 5):
        super().__init__()
        self.missile = missile

    def strike(self, r):
        if self.energy >= 20 and self.missile > 0 and self.x + 10 >= r.x and self.y + 10 >= r.x and self.x - 10 <= r.x
and self.y - 10 <= r.y:
            self.energy -= 20
            self.missile -= 1
            r.health -= 50

    def displayStatus(self):
        print(f"x = {self.x}, y = {self.y}, health = {self.health}, energy = {self.energy}, missiles = {self.missile}")

    def draw(self):
        turtle.showturtle()
        turtle.pu()
        turtle.goto(self.x, self.y)
        turtle.setheading(0)
        turtle.pd()
        turtle.circle(25)

        turtle.left(90)
        turtle.pu()
        turtle.forward(10)
        turtle.right(45)
        turtle.pd()

        for i in range(0, 4):
            turtle.forward(20)
            turtle.left(90)

        turtle.left(45)
        turtle.hideturtle()

    def command(self, robotList):
        asking = True
        while asking:
            choice = input("Possible actions: move, strike")
            if choice == "move":
                newX = int(input("Enter new x-coordinate: "))
                newY = int(input("Enter new y-coordinate: "))
                self.move(newX, newY)
                asking = False
            elif choice == "strike":
                toStrike = int(input("Which Robot to strike: "))
                if len(robotList) >= toStrike:
                    self.strike(robotList[toStrike])
                    asking = False

turtle.speed(10)
RobotBattle()
```

Result:





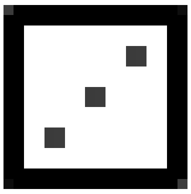
```
x = 0, y = 0, health = 100, energy = 100
================
Enter which robot to order, 'c' to create new robot, 'q' to quitc
Enter which type of robots to create
'r' for Robot, 'm' for MedicBot, 's' for StrikerBotm
==== Robots ====
0  :
x = 0, y = 0, health = 100, energy = 100
1  :
x = 0, y = 0, health = 100, energy = 100
================
Enter which robot to order, 'c' to create new robot, 'q' to quitc
Enter which type of robots to create
'r' for Robot, 'm' for MedicBot, 's' for StrikerBots
==== Robots ====
0  :
x = 0, y = 0, health = 100, energy = 100
1  :
x = 0, y = 0, health = 100, energy = 100
2  :
x = 0, y = 0, health = 100, energy = 100, missiles = 5
================
Enter which robot to order, 'c' to create new robot, 'q' to quit2
Possible actions: move, strikemove
Enter new x-coordinate: 50
Enter new y-coordinate: 70
==== Robots ====
0  :
x = 0, y = 0, health = 100, energy = 100
1  :
x = 0, y = 0, health = 100, energy = 100
2  :
x = 50, y = 70, health = 100, energy = 90, missiles = 5
================
Enter which robot to order, 'c' to create new robot, 'q' to quit1
Possible actions: move, healmove
Enter new x-coordinate: -50
Enter new y-coordinate: -50
==== Robots ====
0  :
x = 0, y = 0, health = 100, energy = 100
1  :
x = -50, y = -50, health = 100, energy = 90
2  :
x = 50, y = 70, health = 100, energy = 90, missiles = 5
================
Enter which robot to order, 'c' to create new robot, 'q' to quit2
Possible actions: move, strikestrike
Which Robot to strike: 0
==== Robots ====
0  :
x = 0, y = 0, health = 100, energy = 100
1  :
x = -50, y = -50, health = 100, energy = 90
2  :
x = 50, y = 70, health = 100, energy = 90, missiles = 5
================
Enter which robot to order, 'c' to create new robot, 'q' to quit1
Possible actions: move, healheal
Which Robot to heal (int): 2
==== Robots ====
0  :
x = 0, y = 0, health = 100, energy = 100
1  :
x = -50, y = -50, health = 100, energy = 90
2  :
x = 50, y = 70, health = 100, energy = 90, missiles = 5
================
Enter which robot to order, 'c' to create new robot, 'q' to quit
```

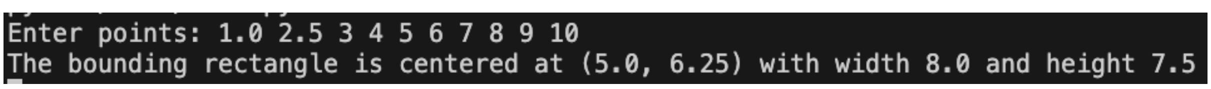
3.

Code:

```
import turtle


class Rectangle2D:
    def __init__(self, first_point):
        self.max_x = first_point.x
        self.min_x = first_point.x
        self.max_y = first_point.y
        self.min_y = first_point.y

    def getRectangle(self, point):
        if point.x > self.max_x:
            self.max_x = point.x
        if point.x < self.min_x:
            self.min_x = point.x

        if point.y > self.max_y:
            self.max_y = point.y
        if point.y < self.min_y:
            self.min_y = point.y

    def draw(self):
        turtle.pu()
        turtle.goto(self.min_x, self.max_y)
        turtle.pd()
        turtle.goto(self.max_x, self.max_y)
        turtle.goto(self.max_x, self.min_y)
        turtle.goto(self.min_x, self.min_y)
        turtle.goto(self.min_x, self.max_y)

    def info(self):
        print(f"The bounding rectangle is centered at ({(self.min_x + self.max_x) / 2}, {(self.min_y + self.max_y) / 2}) with width {self.max_x - self.min_x} and height {self.max_y - self.min_y}")


class Point:
    def __init__(self, x, y):
        self.x = x
        self.y = y

    def draw(self):
        turtle.pu()
        turtle.goto(self.x, self.y)
        turtle.pd()
        turtle.dot(1)


values = [float(x) for x in input("Enter points: ").split()]

points = [Point(values[i], values[i + 1]) for i in range(0, len(values), 2)]

for i in points:
    i.draw()

bounding = Rectangle2D(points[0])

for i in points[1:]:
    bounding.getRectangle(i)

bounding.draw()
turtle.hideturtle()
bounding.info()
turtle.done()
```

Result:





```
Enter points: 1.0 2.5 3 4 5 6 7 8 9 10
The bounding rectangle is centered at (5.0, 6.25) with width 8.0 and height 7.5
```

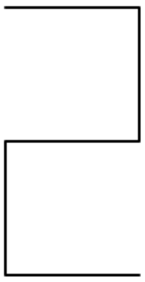
4.

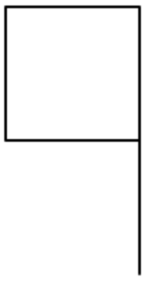
Code:

```
import turtle

from abc import ABC, abstractmethod

class Char(ABC):
    @abstractmethod
    def draw(self, x, y):
        pass

    @abstractmethod
    def getWidth(self):
        pass

class Char0(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
```

```python
        turtle.goto(x, y)
        self.start = turtle.xcor()

        for i in range(2):
            turtle.pd()
            turtle.forward(50)
            turtle.right(90)
            turtle.forward(100)
            turtle.right(90)
            self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char1(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(100)
        turtle.right(90)
        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char2(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char3(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()
        turtle.pd()
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(180)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char4(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.right(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(180)
        turtle.forward(100)
        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char5(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.forward(50)
        turtle.right(180)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)

        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char6(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.forward(50)
        turtle.right(180)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(100)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)

        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char7(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.left(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(100)
        turtle.right(90)

        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char8(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.left(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)
        turtle.left(90)
        turtle.forward(50)

        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))

class Char9(Char):
    def __init__(self):
        super().__init__()
        self.start = 0
        self.end = 0

    def draw(self, x, y):
        turtle.showturtle()
        turtle.pu()
        turtle.setheading(0)
        turtle.goto(x, y)
        self.start = turtle.xcor()

        turtle.pd()
        turtle.left(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        turtle.left(180)
        turtle.forward(50)
        turtle.right(90)
        turtle.forward(50)
        self.end = turtle.xcor()
        turtle.hideturtle()

    def getWidth(self):
        return print(round(self.end - self.start))


zero = Char2()
zero.draw(0, 0)
zero.getWidth()
turtle.done()
```

Result:





```
50
```

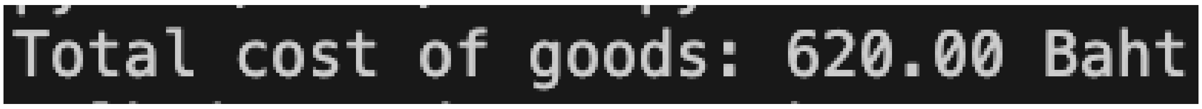
```
50
```

5.

Code:

```
from abc import ABC, abstractclassmethod

class StationaryGood(ABC):
    @abstractclassmethod
    def getCost(self):
        pass

class Magazine(StationaryGood):
    def __init__(self, title, price, quantity):
        self.title = title
        self.price = price
        self.quantity = quantity

    def getCost(self):
        return self.price * self.quantity

class Book(StationaryGood):
    def __init__(self, title, price, quantity):
        self.title = title
        self.price = price
        self.quantity = quantity

    def getCost(self):
        discount_price = self.price * 0.9
        return discount_price * self.quantity

class Ribbon(StationaryGood):
    def __init__(self, color, length_m):
        self.color = color
        self.length_m = length_m

    def getCost(self):
        return 5 * self.length_m

def getTotalCost(basket):
    total = 0
    for item in basket:
        total += item.getCost()
    return total

item1 = Magazine("Computer World", 70, 3)
item2 = Book("Windows 7 for Beginners", 200, 2)
item3 = Ribbon("Blue", 10)

items = [item1, item2, item3]
total = getTotalCost(items)
print(f"Total cost of goods: {total:.2f} Baht")
```

Result:



```
Total cost of goods: 620.00 Baht
```