University of Staffordshire

Week 2 – Problem Solving, Pseudocode, User Input and Functions

Activity 1 – A Pizza Calculator (Portfolio task)

Project name: pizza_calculator

Ensure you complete this activity and add the source code **pizza_calculator.py** and screenshot of the output to your week 2 folder (see Step 5 below the task)

You must write problem solving steps using stepwise refinement, algorithm, pseudocode and then finally the python code.

Write a small program to calculate the **total cost** of a simple pizza order, including **sales tax**. Say we're ordering one or more pizzas that all cost the same, and we're ordering in **Stoke-on-Trent, UK**.
There is a sales tax **not** included in the **menu price** but is added at the end of the purchase. The rate is 20 percent, meaning that for every pound we pay for the pizza, we must also pay 20 pence in sales tax. We could model this program in words as follows:

- Ask the person how many pizzas they want.
- Ask for the menu cost of each pizza.
- Calculate the total cost of the pizzas as our subtotal.
- Calculate the sales tax owed, at 20 percent of the subtotal.
- Add the sales tax to the subtotal for the final total.
- Show the user the total amount due, including tax.

Use math formulas to calculate new numbers, like the cost of 20 pizzas.

Step 1: Create a new Python script file
- Create a new file called **pizza_calculator.py** in your week 2 folder

Step 2: Write problem solving steps using stepwise refinement and algorithm:
- Write problem solving steps using the stepwise refinement process
- Write an algorithm and pseudocode to calculate the total cost, sales tax owed and final total cost

Step 3: Write the Python code
- Write the Python code for the solution defined in Step 2

- o **Important: Keep everything you've written in Step 2 as comments in your Python code**

Step 4: Run your program
- Run the program and make sure that you are getting the output that you are expecting

Step 5: Take a screenshot of the output
- Take a screenshot of the application window showing the program output
- Paste the screenshot into Paint and save it in your project folder as **_pizza_calculator.jpg_**.

Activity 2 – Programming with Turtle: Solar System (Portfolio task)

Project name: solar_system

Ensure you complete this task and add the source code **_solar_system.py_** and screenshot of the output to your week 2 folder (see Step 5 below the task)

Step 1: Create a new Python script file
- Create a new file called **_solar_system.py_** in your week 2 folder
- Type the following code into your file

```python
import turtle

speed(0)

# set the background color
bgcolor("black")

# create the ORANGE planet
color("orange")
begin_fill()
circle(60)
end_fill()

# move down
right(90)
penup()
forward(70)
pendown()
left(90)

# create the GRAY planet
```

```
color("gray")
begin_fill()
circle(20)
end_fill()

# move down
right(90)
penup()
forward(100)
pendown()
left(90)

# create the RED planet
color("red")
begin_fill()
circle(40)
end_fill()

# move down
right(90)
penup()
forward(100)
pendown()
left(90)

# create the GREEN planet
color("green")
begin_fill()
circle(30)
end_fill()

done()
```

Step 2: Analyse the code and modify the code to include the missing initialising
- Include the screen and turtle setup
- Prefix the correct variables to fix the errors

Step 3: Run your program
- Does your program run? If not, what errors do you have? Look at previous examples to see if you've used the correct code.

Step 4: Modify your code to convert the repeated code into functions:
- Create planet passing colour and radius parameter
- Moving the pen

Step 5: Take a screenshot of the output
- Take a screenshot of the application window showing the program output
- Paste the screenshot into Paint and save it in your project folder as **solar_system.jpg**.