

solutions

February 10, 2022

Question 1

```
[1]: # separator needs to be specified
shour, sminu, ssec = input("Enter the time in HH:MM:SS format: ").split(":")

# use of min as name would overwrite the built-in function min()
hour, minu, sec = int(shour), int(sminu), int(ssec)
print ("hour =", hour, "minute =", minu, "second =", sec)
```

Enter the time in HH:MM:SS format: 12:22:34
hour = 12 minute = 22 second = 34

Alternative

```
[2]: # store the complete time string first
time = input("Enter the time in HH:MM:SS format: ")
# separator needs to be specified
shour, sminu, ssec = time.split(":")

# use of min as name would overwrite the built-in function min()
hour, minu, sec = int(shour), int(sminu), int(ssec)
print ("hour =", hour, "minute =", minu, "second =", sec)
```

Enter the time in HH:MM:SS format: 12:22:44
hour = 12 minute = 22 second = 44

Question 2

```
[3]: import numpy as np

for radius in range(2, 21, 2): # stop needs to be 21 or 22
    area = 4.0 * np.pi * radius**2
    volume = 4.0 / 3.0 * np.pi * radius**3
    print ("radius =", radius, " area =", area, "volume =", volume)
```

radius = 2	area = 50.26548245743669	volume = 33.510321638291124
radius = 4	area = 201.06192982974676	volume = 268.082573106329
radius = 6	area = 452.3893421169302	volume = 904.7786842338603
radius = 8	area = 804.247719318987	volume = 2144.660584850632
radius = 10	area = 1256.6370614359173	volume = 4188.790204786391

radius = 12	area = 1809.5573684677208	volume = 7238.229473870882
radius = 14	area = 2463.0086404143976	volume = 11494.040321933855
radius = 16	area = 3216.990877275948	volume = 17157.284678805056
radius = 18	area = 4071.5040790523717	volume = 24429.02447431423
radius = 20	area = 5026.548245743669	volume = 33510.32163829113

Question 3

```
[4]: sum = 0.0 # needs to have a value before the loop starts

for i in range (3):
    num = float(input("Enter a number: "))
    sum = sum + num

print ("The sum is", sum)
print ("The average is ", sum/3.0)
```

```
Enter a number: 1
Enter a number: 2
Enter a number: 3
The sum is 6.0
The average is  2.0
```

Question 4

```
[5]: import numpy as np

def vol_radius(r):
    """ Calculates the volume of a sphere from its radius """

    vol = 4. / 3. * np.pi * r**3
    return vol

def vol_diameter(d):
    """ Calculates the volume of a sphere from its diameter """

    vol = 4. / 3. * np.pi *(d/2.0)**3
    return vol

# main program starts here
x = float(input("Enter radius or diameter " ))
choice = input("Enter r for radius or d for diameter " )

# nothing will happen if input is not r or d
if choice == "r":
    print("The volume is", vol_radius(x))
elif choice == "d":
```

```
print("The volume is", vol_diameter(x))
```

Enter radius or diameter 2

Enter r for radius or d for diameter d

The volume is 4.1887902047863905

```
[7]: import numpy as np

def vol_radius(r):
    """ Calculates the volume of a sphere from its radius """

    vol = 4. / 3. * np.pi * r**3
    return vol

def vol_diameter(d):
    """ Calculates the volume of a sphere from its diameter """

    vol = 4. / 3. * np.pi * (d/2.0)**3
    return vol

# main program starts here
choice = "d" # choice needs to preset with a value giving a True value for
↳while

while choice == "d" or choice == "r":

    x = float(input("Enter radius or diameter " ))
    choice = input("Enter r for radius or d for diameter " )

    # nothing will happen if input is not r or d
    if choice == "r":
        print("The volume is", vol_radius(x))
    elif choice == "d":
        print("The volume is", vol_diameter(x))
    print() # empty line
```

Enter radius or diameter 4

Enter r for radius or d for diameter d

The volume is 33.510321638291124

Enter radius or diameter 4

Enter r for radius or d for diameter s

Question 6

```
[8]: def factorial(n):  
      """  
      Returns the factorial of the argument using a simple loop  
      """  
  
      fac = 1  
      for i in range(1, n+1): # start at 1 and multiply up to n  
          fac = fac * i  
      return fac  
  
      # main program  
      number = int(input("Enter a number: "))  
      print ("n! =", factorial(number))
```

Enter a number: 55

n! = 1269640335365827592596510084756651695958032105144943676227584000000000000

Question 7

```
[9]: text = "University of Hertfordshire"  
  
      print(text[9])  
      print(text[14])  
      print(text[-1])
```

y
H
e

Question 8

```
[10]: text = "University of Hertfordshire"  
  
      print(text[14:27])  
  
      # alternative  
      print(text[14:])
```

Hertfordshire
Hertfordshire

Question 9

```
[11]: # part a  
      shopping = ["bread", "butter", "boomerang", "beans", "broccoli"]  
      print (shopping)  
      print()
```

```

# part b
# remember Python counts from 0
print (shopping[3])
print()

# part c
# numbering for slicing different from indexing. Confusing, I know.
print (shopping[2:4])
print()

# part d
shopping[4] = "blueberry"
print (shopping)
print()

# alternative way
shopping[-1] = "blackcurrant"
print (shopping)
print()

# part e
shopping.append("banana")
print (shopping)

```

```
['bread', 'butter', 'boomerang', 'beans', 'broccoli']
```

```
beans
```

```
['boomerang', 'beans']
```

```
['bread', 'butter', 'boomerang', 'beans', 'blueberry']
```

```
['bread', 'butter', 'boomerang', 'beans', 'blackcurrant']
```

```
['bread', 'butter', 'boomerang', 'beans', 'blackcurrant', 'banana']
```

```
[ ]:
```