Math in Python (class slides)

CSc 110 Math in Python

The Mathematical Operators

- **+** Addition
- **-** Subtraction
- ***** Multiplication
- **/** Division
- **//** Integer Division
- ****** Exponent
- **%** Modulus

The order of Operations (PEMDAS)

1. **P**arentheses,
2. **E**xponentiation
3. **M**ultiplication and **D**ivision have equal precedence
4. **A**ddition and **S**ubtraction have equal precedence

Write a function

Write a function that calculates the area of a square:

1. Its name is `square_area`
2. It takes one argument: `side`
3. It calculates the area of a square (a quadrilateral with two sides parallel that are of equal length). The area of a square is calculated by multiplying the side by itself ($area = side^2$).
4. It returns the value for calculated square area.

Square Area

```
def square_area(side):
  # enter your code here

print(square_area(5)) # 25
print(square_area(6)) # 36
print(square_area(10)) # 100
```

Square Area

```
def square_area(side):
  "calculates the area of a square"
  area = side * side
  return area

print(square_area(5)) # 25
print(square_area(6)) # 36
print(square_area(10)) # 100
```

```
25
36
100
```

Rounding numbers with built-in function `round()`

`round()`

Use the round() function to get a floating-point number rounded to the specified number of decimals.

Syntax:

```
round(number, ndigits*)
```

The number of digits (`ndigits`) is optional, but we will often round number to two decimals:

```
round(392.68750000000006, 2)
```

```
392.69
```

round()

Use the round() function to get a floating-point number rounded to the specified number of decimals.

Syntax:

```
round(number, ndigits*)
```

Rounding is done toward the even choice. What would these round to? (discuss with your group)

```
round(51.6)
round(51.5)
round(50.5)
round(51.4)
```

round()

Use the round() function to get a floating-point number rounded to the specified number of decimals.

Syntax:

```
round(number, ndigits*)
```

Rounding is done toward the even choice. What would these round to:

```
print(round(51.6))
print(round(51.5))
print(round(50.5))
print(round(51.4))
```

```
52
52
50
51
```

Write a function

Write a function that calculates the volume of a sphere:

1. Its name is `sphere_volume`
2. It takes one argument: `radius`
3. It calculates the volume of the sphere (use `3.1415` for π):

$$v = 4/3 \cdot \pi \cdot radius^3$$

4. It returns the value for the calculated sphere volume
5. Test case: `sphere_volume(.75)` should return `1.77`.

Write a function – sphere volume

```python
def sphere_volume(radius):
    "calculates the volume of a sphere of given radius"
    volume = (4 / 3) * 3.1415 * radius**3
    return round(volume, 2)

print(sphere_volume(.75)) # 1.77
print(sphere_volume(2)) # 33.51
print(sphere_volume(5.5)) # 696.89
```

```
1.77
33.51
696.89
```

Write a function

Write a function that calculates the area of a sphere:

1. Its name is `sphere_area`
2. It takes one argument: `radius`
3. It calculates the volume of the sphere (use `3.1415` for π):

$$a = 4 \cdot \pi \cdot radius^2$$

4. It returns the value for the calculated sphere area
5. Test case: `sphere_area(.75)` should return `7.07`.

Write a function – solutions

```python
def sphere_volume(radius):
    "calculates the volume of a sphere of given radius"
    volume = (4 / 3) * 3.1415 * radius**3
    return round(volume, 2)


def sphere_area(radius):
    "calculates the area of a sphere of given radius"
    area = 4 * 3.1415 * radius**2
    return round(area, 2)


r = .75
v = sphere_volume(r)
a = sphere_area(r)
print(v, a)
```

```
1.77 7.07
```

Write a function – sphere volume and area

Submit your sphere volume and area solution as attendance on Gradescope.

Name your file `sphere.py`