

Part 2

August 2017

1. Do question 2 from part 1, but this time allow the user to input the values of m and v , then print the result. Hint: user input should be converted to a float; consider the `float()` method.

```
m = float(input('Please enter the mass: '))
v = float(input('Please enter the velocity: '))
E = 0.5*m*v**2
print(E)
```

2. Write a program that takes a person's name as input and then prints the following given the name John Smith:

```
Your name is John Smith, Congratulations!!!
```

```
name = (input('Please enter you name'))
print('Your name is', name, ', Congratulations!!!')
```

3. Use python to find the value of pi to the tenth power and print the result.

```
from numpy import pi
print(pi**10)
```

```
## 93648.04747608298
```

4. The growth of a bacterial colony can be modeled by the formula $a = a_0 \cdot \exp(t)$ where a is the population at time t , a_0 is the initial bacterial population, t is time in days. Write a program that will introduce the variable `a_0` with value 100 representing the initial population and prints the bacterial population every day for 5 days. Hint: `exp()` is a function accessible through the `numpy` module.

```
from numpy import exp
a_0 = 100.
print("Day 1: ", a_0*exp(1))
print("Day 2: ", a_0*exp(2))
print("Day 3: ", a_0*exp(3))
print("Day 4: ", a_0*exp(4))
print("Day 5: ", a_0*exp(5))
```

```
## Day 1: 271.828182846
```

```
## Day 2: 738.905609893
```

```
## Day 3: 2008.55369232
```

```
## Day 4: 5459.81500331
```

```
## Day 5: 14841.3159103
```

5. Use python to find the value of e to the tenth power and print the result.

```
from numpy import exp
print(exp(10))
```

```
## 22026.4657948
```

6. Write a program that prompts the user to input a number. Assume the input will be positive. Print the natural logarithm of this number.

```
from numpy import log
number = float(input("Please enter a positive number: "))
print(log(number))
```

7. Write a program that prompts the user to input the lengths of two sides of a triangle and the angle between them (in degrees). Print out the area of this triangle (recall $A = ab \sin \theta$).

```
from numpy import sin, pi
#e.g. a,b,theta=1.0,2.0, 40.
a = float(input("Please enter length of a: "))
b = float(input("Please enter length of b: "))
theta = float(input("Please enter angle between a and b in degrees: "))
theta_radians = theta * pi / 180
print("The area is", a * b * sin(theta_radians))
```

8. Write a function `add()` that takes two numbers as parameters and returns their sum.

```
def add(a, b):
    return a + b
```

9. Write a function `tenth_power()` that takes one number as a parameter and returns the value of the number to the tenth power.

```
def tenth_power(a):
    return a ** 10
```