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## **Stages of the Program:**

- 1) Inserted the Header files and libraries required like "math.h", "stdio.h", etc.,
- 2) In the main function, at first declared and initialized 2 arrays to hold the mass and max speed values.
- 3) Determined the array size of bodymass (max.speed) using size of operator.
- 4) Declared and initialized the elements of inverse matrix  $(M^{-1})$  and vector (b) to zero.
- 5) Used the flow control statement— "For loop" to calculate the values of matrix elements simultaneously and synchronously.
- 6) Plugged in the matrix and vector elements in the following expression to calculate co-efficient and exponent.

$$c = e^{(m22*b1)+(-m12*b2))/((m11*m22)-(m12*m21)}$$
  
 $a=((-m21*b1)+(m11*b2))/((m11*m22)-(m12*m21))$ 

7) Designed user output for the program that includes 1) Assignment details 2) Topic of the program 3) Data table 4) Co-efficient and exponents 5) Physical relationship in a form of an equation.

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## **Proof of program validity:**

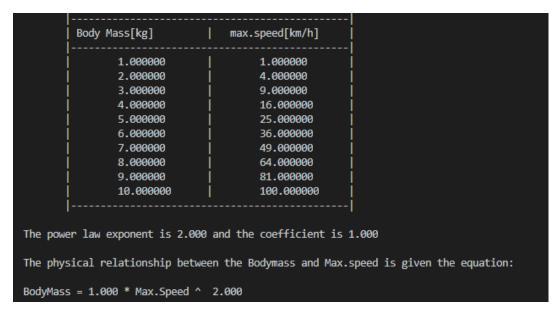
A known curve for power law validation was considered. The Equation considered is a simple known parabola.

$$Y = C x^a$$
 where **C** = **1** and **a** = **2**

This would yield the following values for X (MaxSpeed) and Y (Body mass)

```
// Validation case for a simple known parabola y = 1 * x ^ 2:
double mass[] = { 1,2,3,4,5,6,7,8,9,10 }; // X
double maxSpeed[]={ 1,4,9,16,25,36,49,64,81,100}; // Y
```

**To Prove**: The program is valid, if the coefficient is 1 and exponent is 2 this given known parabolic data set.



## output

Result: Since, resulting output coefficient is 1 and exponent is 2, This proves that program is valid

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## **Challenges faced:**

- 1) Finding way to determine the length of the array was challenging.
- 2) Commands used for executing program that includes header file "math.h" in WSL command line was not explicitly known. Hence, it a lot time to debug the program why it was wrong. In General debugging was difficult and challenging.
- 3) In General Compiler & VS code setup was challenging due to the unfamiliarity.