**Question No: 01**

#include <stdio.h>

#include <math.h>

int main() {

    // Declare variables

    double initial\_population;

    double percentage\_increase; // Percentage increase over known time

    double known\_time; // Time for the known increase (years)

    double target\_time; // Time to calculate the population (years)

    double growth\_rate; // Growth rate (k)

    double calculated\_population; // Population after target time

    printf("Enter the initial population: ");

    scanf("%lf", &initial\_population);

    printf("Enter the percentage increase (e.g., 35 for 35%%): ");

    scanf("%lf", &percentage\_increase);

    printf("Enter the time period for the percentage increase (in years): ");

    scanf("%lf", &known\_time);

    printf("Enter the time for which to calculate the population (in years): ");

    scanf("%lf", &target\_time);

    // Calculate the population after the known time

    double population\_after\_known\_time = initial\_population \* (1 + percentage\_increase / 100);

    // Calculate growth rate (k)

    growth\_rate = log(population\_after\_known\_time / initial\_population) / known\_time;

    // Calculate the population after the target time

    calculated\_population = initial\_population \* exp(growth\_rate \* target\_time);

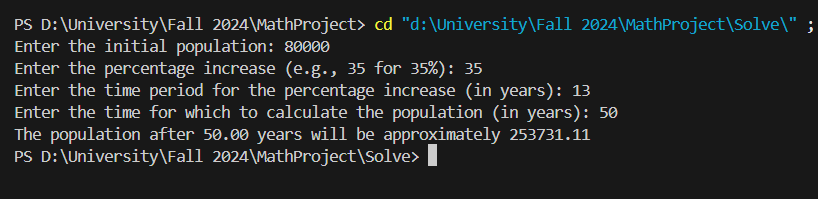
    //result

    printf("The population after %.2f years will be approximately %.2f\n", target\_time, calculated\_population);

    return 0;

}

**Output:**

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**Question No: 02**

#include <stdio.h>

#include <math.h>

int main() {

    double Enviroment\_temp, initial\_temp, temp\_after\_1\_min, time, cooling\_constant, final\_temp;

    printf("Enter the Enviroment temperature (in Celsius): ");

    scanf("%lf", &Enviroment\_temp);

    printf("Enter the initial temperature of the body (in Celsius): ");

    scanf("%lf", &initial\_temp);

    printf("Enter the temperature of the body after 1 minute (in Celsius): ");

    scanf("%lf", &temp\_after\_1\_min);

    printf("Enter the time in minutes for which to calculate the temperature: ");

    scanf("%lf", &time);

    // Validate input

    if (initial\_temp <= Enviroment\_temp || temp\_after\_1\_min <= Enviroment\_temp || temp\_after\_1\_min >= initial\_temp) {

        printf("Error: Input values must satisfy initial\_temp > temp\_after\_1\_min > Enviroment\_temp.\n");

        return 1;

    }

    //Calculate the cooling constant (k)

    cooling\_constant = -log((temp\_after\_1\_min - Enviroment\_temp) / (initial\_temp - Enviroment\_temp));

    //Calculate the temperature at the given time

    final\_temp = Enviroment\_temp + (initial\_temp - Enviroment\_temp) \* exp(-cooling\_constant \* time);

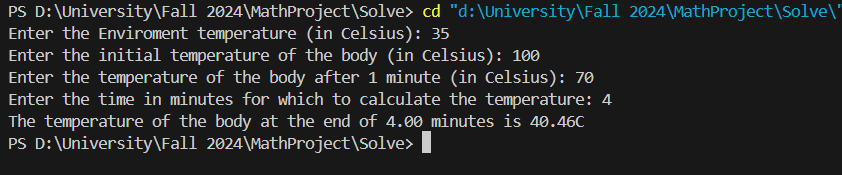
    //result

    printf("The temperature of the body at the end of %.2lf minutes is %.2lfC\n", time, final\_temp);

    return 0;

}

**Output:**

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**Question No: 03**

#include <stdio.h>

#include <math.h>

int main() {

    double total\_S, S\_converted, t1, t2, S\_total\_converted;

    printf("Enter the amount of sugar (grams): ");

    scanf("%lf", &total\_S);

    printf("Enter the amount converted in time t1 (grams): ");

    scanf("%lf", &S\_converted);

    printf("Enter the time t1 (min): ");

    scanf("%lf", &t1);

    printf("Enter the time to find the conversion (min): ");

    scanf("%lf", &t2);

    double k = -log(1 - S\_converted / total\_S) / t1;

    S\_total\_converted = total\_S \* (1 - exp(-k \* t2)); // exp -> e to the power -k\*t2

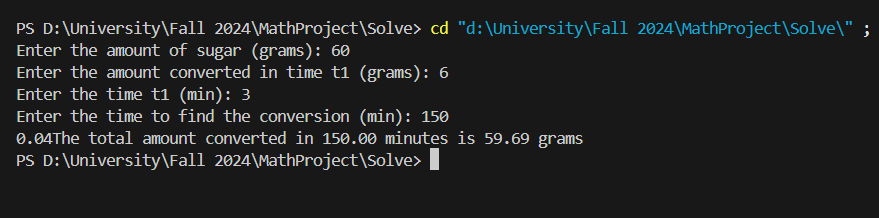
    printf("%.2lf",k);

    printf("The total amount converted in %.2lf minutes is %.2lf grams\n", t2, S\_total\_converted);

    return 0;

}

**Output:**

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