

Day 2 - Programs at Bootcamp

Section A - Elements of Programming :- Condition, Loops and Logical Programming

1. Write a program `Stats5.java` that prints five uniform random values between 0 and 1, their average value, and their minimum and maximum value. Use `Math.random()`, `Math.min()`, and `Math.max()`.
2. Write a program **`WindChill.java`** that takes two double command-line arguments `t` and `v` and prints the wind chill. Use `Math.pow(a, b)` to compute a^b .

Given the temperature `t` (in Fahrenheit) and the wind speed `v` (in miles per hour), the National Weather Service defines the effective temperature (the wind chill) to be:

$$w = 35.74 + 0.6215 t + (0.4275 t - 35.75) v^{0.16}$$

Note: the formula is not valid if `t` is larger than 50 in absolute value or if `v` is larger than 120 or less than 3 (you may assume that the values you get are in that range).

3. Write a **`TemperaturConversion.java`** program, given the temperature in fahrenheit as input outputs the temperature in Celsius or viceversa using the formula
Celsius to Fahrenheit: $(^{\circ}\text{C} \times 9/5) + 32 = ^{\circ}\text{F}$
Fahrenheit to Celsius: $(^{\circ}\text{F} - 32) \times 5/9 = ^{\circ}\text{C}$
4. Write a program **`Trig.java`** to illustrate various trigonometric functions in the Math library, such as `Math.sin()`, `Math.cos()`, and `Math.toRadians()`. Firstly reads in an angle (in degrees), converts to radians, and then performs various trigonometric calculations.
5. Write a program **`FlipCoin.java`** to simulate a coin flip and print out "Heads" or "Tails" accordingly and finally print the percentage of Head vs Tail.
6. Write a program **`PowerOf2.java`** that takes a command-line argument `n` and prints a table of the powers of 2 that are less than or equal to 2^n .
7. Write a program **`HarmonicNumber.java`** that takes a command-line argument `n` and prints the `n`th harmonic number. Harmonic Number is of the form

$$H_n = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n}$$

Day 2 - Programs at Home

Section A - Elements of Programming :- Condition, Loops and Logical Programming

1. Write a program **DayOfWeek.java** that takes a date as input and prints the day of the week that date falls on. Your program should take three command-line arguments: m (month), d (day), and y (year). For m use 1 for January, 2 for February, and so forth. For output print 0 for Sunday, 1 for Monday, 2 for Tuesday, and so forth. Use the following formulas, for the Gregorian calendar (where / denotes integer division):

$$y_0 = y - (14 - m) / 12$$

$$x = y_0 + y_0/4 - y_0/100 + y_0/400$$

$$m_0 = m + 12 \times ((14 - m) / 12) - 2$$

$$d_0 = (d + x + 31m_0 / 12) \bmod 7$$

2. Write a program **CarLoan.java** that reads in three command-line arguments P, Y, and R and calculates the monthly payments you would have to make over Y years to pay off a P principal loan amount at R per cent interest compounded monthly. The formula is The formula is

$$\text{payment} = \frac{P r}{1 - (1 + r)^{-n}}, \text{ where } n = 12 * Y, r = R / (12 * 100)$$

3. Write a Program **Sqrt.java** to compute the square root of a nonnegative number c given in the input using Newton's method:
 - initialize t = c
 - replace t with the average of c/t and t
 - repeat until desired accuracy reached using condition `Math.abs(t - c/t) > epsilon*t` where epsilon = 1e-15;
4. Write a Program **GamblingSimulator.java** where a gambler starts with certain stake in INR and places fair Re 1 bet until he/she goes broke or reaches the goal set as input. Keeps track of the number of times won and number of bets made. Run the simulation N times.

Input - stake, goal and trails are taken as input

Output - Number of times won, Percent Win and Avg number of bets made.

