

Tasks

Task 1.

There are three variables with the same name `x`: global, local, and inside a block. Print their values in order: global, local, inner block. Use the scope resolution operator `::` when necessary.

Task 2.

Read two integers `x` and `y`. If `y` is not zero, print `x / y`. Otherwise, print "Error". Use the conditional operator `?:`.

Task 3.

Read three integers `a`, `b`, `c`. Print the maximum. Use only nested `if/else`.

Task 4.

Read integer `n`. Using a `while` loop with postfix decrement, print numbers from `n-1` down to 0.

Task 5.

Demonstrate the difference between `a++` and `++a`. Read integer `n`. Print values of `a++` and `++a` in

Task 6.

Read `x` `y`. Use short-circuit logic (`&&` and `||`) to ensure safe division. Print `x / y` if `y != 0`,

Task 7.

Read integer `n`. Print "YES" if `n` is a power of two, otherwise "NO". Use `(n & (n-1))`.

Task 8.

Read integer `n`. Count number of 1 bits in binary representation using `x &= (x-1)`.

Task 9.

Read integer `x` and bit index `k`. Toggle the `k`-th bit of `x` (0-based). Print the result.

Task 10.

Given integer `n > 0`, repeatedly apply:

- If `n` is even $\rightarrow n = n / 2$
 - Else $\rightarrow n = 3*n + 1$
- Stop when `n == 1`. Print number of steps.

Task 11.

Read two integers `a`, `b`. Print the larger using only the ternary operator `?:`.

Task 12

Find the smallest positive `double` `z` such that dividing by 2 gives 0.0. Print the last nonzero and

Task 13.

Read integer `score` (`0..100`). Print "A" (`>=90`), "B" (`>=80`), "C" (`>=70`), "D" (`>=60`), "F" otherwise. Implement only with nested `if/else`.

Task 14.

Read two integers `a`, `b`. Swap them without using a third variable, only XOR. Print the swapped values.

Task 15.

Read integer `n`. Using only `while`, compute sum $1+2+\dots+n$.

Task 16.

Print the sum. Check it with WolframAlpha.

$$S = 1 + \frac{1}{2} + \frac{1}{3} + \dots$$

Task 17.

Use the infinite series:

$$\pi = 4 \cdot \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots\right)$$

Read `eps`. Compute partial sums until the absolute value of the next term is smaller than `eps`. Print approximation of π . Check it with WolframAlpha.

Task 18.

Approximate e^x using its Taylor expansion:

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \dots$$

Stop when the absolute value of the next term is less than `eps`.

Task 19.

Approximate `sin(x)` using the series:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$$

Stop when the absolute value of the next term is smaller than `eps`.

Task 20.

Compute the double sum

$$S(n) = \sum_{i=1}^n \sum_{j=1}^n \frac{1}{i \cdot j}.$$

Use **nested loops**. Print $S(n)$ with 6 decimal places.