

Tutorial 2: Expressions and Conditional Execution

These are **formative exercises**, i.e. they are not assessed but are intended to help you develop your programming skills. You should try to solve these problems after you have attended the relevant lecture. Solutions will be provided on Vision about a week later.

Expressions

Using appropriate types and operators, using a `Scanner` to read user input, and using `System.out.println` to generate output, write programs that do the following:

1. Print out the square of a number entered by the user.
Note that you can multiply a number by itself to get its square.
2. Convert a temperature value entered by the user in Celsius into Fahrenheit.
The formula for the conversion is $F = (C \times 9/5) + 32$.
Check whether it is working correctly by comparing with <http://www.calculconversion.com/conversion-celsius-to-fahrenheit.html>
If it's not quite working, think about whether each number is being treated as an integer or a floating point value.
3. Ask the user to enter their age in years, and then convert this to days, hours and minutes.
Define integer constants to indicate the number of days in a year, the number of hours in a day, and the number of minutes in an hour, and then use these constants in your expressions. You can assume there are 365 days in a year, although if you really want a challenge, you can write some code to figure out which years were leap years.

Conditional Execution

Write programs to do the following:

1. Read in **two** numbers from the user, and then output some text saying (a) which is the smallest, and (b) which is the largest of the numbers entered.
2. Read in **three** numbers from the user, and then output some text saying (a) which is the smallest, and (b) which is the largest of all the numbers entered. Think about how you might use an extra variable to reduce the number of comparisons.
3. Read in an integer from the user, and then output some text to say whether it is positive or negative, and odd or even. Note that you can use the modulus (%) operator for the latter, i.e. if $x \% 2 == 0$, then x is even. Assuming the user entered 5, the output should be formatted in the following way: The number 5 is positive and even.
4. Do (2) again, but this time use two boolean variables, one to store whether the number is positive or negative, the other to store whether it is odd or even. Then, use these variables to decide what to print. Use `print` (i.e. no line break afterwards) rather than `println` as you go along, and see whether you can reduce the amount of printing code compared

to your solution to (2). If you're feeling ambitious, then try to use the ternary operator (?:) to generate all the output in one `println` statement.

5. Ask the user to enter a month in numeric form (i.e. 1 for January, ..., 12 for December) and then print out the number of days in the month. Recall that "30 days has September, April, June and November; all the rest have 31, except February, which has 28 (or 29, but I wouldn't worry about that)". First try using an `if...else` statement and then try using a `switch...case` statement. Which one is more readable?

More Exercises

Here are some good websites for more exercises on conditional execution and Boolean logic:

<https://www.w3resource.com/java-exercises/conditional-statement/index.php>

<https://codingbat.com/java/Logic-1>

<https://codingbat.com/java/Logic-2>