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CSCI 141
(all sections)
Fall 2021
Assignment

Assignment 1

Due: Monday 9/13/2021 11:59pm

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Directions

For this assignment, you will perform various calculations and display the results. We recommend you commit and push changes to your code and often to your GitHub repository. See the [Example Output](#) for guidance on how the program should perform.

You will perform the following calculations:

1. Convert a temperature in Fahrenheit to Celsius
2. Compute the height of a building given the observer's height, distance, and angle of elevation
3. Compute the probability of a loot drop over some number of runs

Here is the assignment invitation link on GitHub Classroom:

<https://classroom.github.com/a/-OOaYhz9>

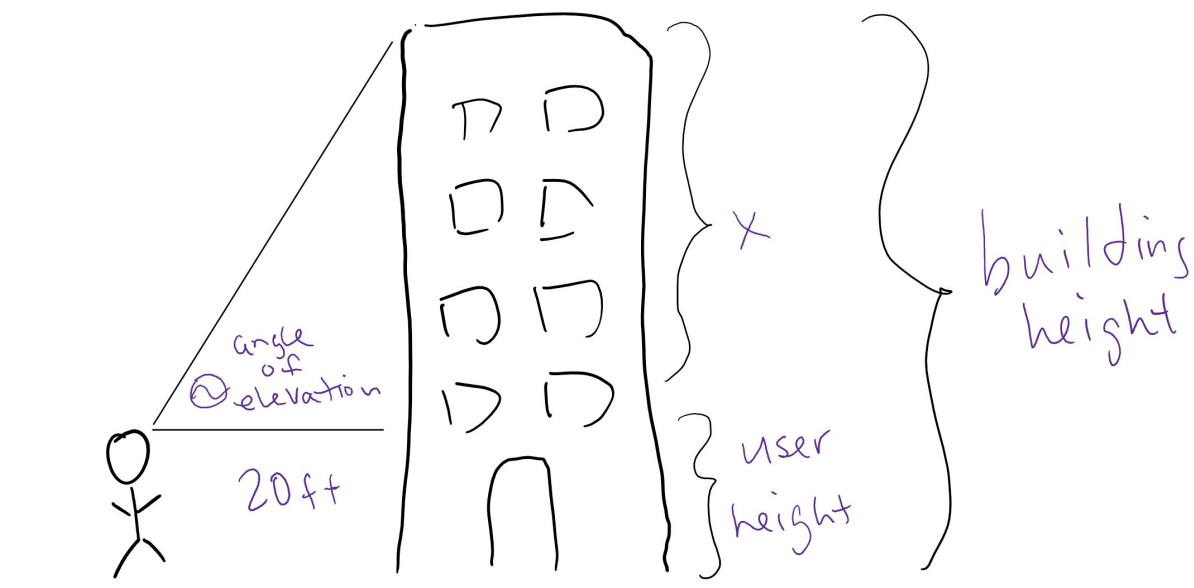
1) Fahrenheit to Celsius

Ask the user for a temperature in Fahrenheit. Read it in with a **Scanner** object using the function `readLine()`. This will return the temperature as a **String** result. Convert that result to a **float** or **double** using `Float.parseFloat()` or `Double.parseDouble()`, respectively. Once you have the user's input stored as a **float** or **double** variable, you can then use it in a math calculation. Here is the equation to convert a Fahrenheit temperature to Celsius:

$$Celsius = (Fahrenheit - 32) * \frac{5}{9} \quad (1)$$

2) Building Height

Given the user's height, distance from a building, and the [angle of elevation](#) from the top of their head to the top of the building, compute a rough estimate of the height of the building. Recall your trigonometry functions (e.g. `Math.tan()`). Note that all [Math class functions](#) accept inputs as radians, not angles. You can use the function `Math.toRadians()` to convert an angle to radians. The distance from the building is already assumed, but you can ask the user for this input as well for a more complete program. Display the building height in both feet and meters.



3) Drop Probability

Given the drop rate of a loot item of interest and the number of attempts to acquire it, what is the probability that the loot item will drop at least once? First, ask the user for both the drop rate (as a percentage) and the number of attempts. Convert the drop rate to a fraction (i.e. divide by 100). To compute the probability of the item dropping at least once for some number of attempts, we can borrow from probability and statistics. Ultimately we would use the [binomial distribution](#) or binomial coefficient probability mass function:

$$f(k, n, p) = \binom{n}{k} p^k (1 - p)^{n-k} \quad (2)$$

where n is the number of attempts, k is the number of successful drops during those attempts, and p is the drop rate. However, the probability of a loot item successfully dropping over some number of attempts can be simplified as the inverse of the probability of all failed attempts, or:

$$Probability = 1 - (failrate)^n \quad (3)$$

where n is the number of attempts and *failrate* is the inverse of the drop rate (i.e. $1 - \text{drop rate}$). [Here is a good explanation](#) of why this equation works.

Submission

You will commit and push your changes to your specific GitHub Classroom repository for this assignment. Please follow the directions in this assignment to install all software. Commit and push your code changes early and often any time before the due date. Please see the advice below; it is important for grading purposes. **Failure to follow these directions will result in a loss of points.**

Always make sure to:

- Keep all source files in the folder called `src`, which is one directory in from the root of your repo
- Do not commit multiple copies of the same named source file; modify the ones provided to you. In other words, do not make an old and new version of the same file
- The main starting source file should always be called `Main`
- When loading resources, do not use absolute paths to files on your drive; [use relative paths](#)
- Do not have the keyword `package` at the top of any files. Some IDEs add your files to a custom package by default. Please remove this, as it complicates grading.

Rubric

Task	Percentage
Assignment files submitted to Canvas instead of GitHub	Grade is 0%
General attempt at the assignment	50%
Temperature conversion	10%
Building height computation	20%
Loot probability computation	20%
Total	100%

Example Output

```
Windows PowerShell
PS C:\Users\delrocco> cd .\Desktop\assign\
PS C:\Users\delrocco\Desktop\assign> javac *.java
PS C:\Users\delrocco\Desktop\assign> java Main
Let's convert temperature!
What's the temperature in Fahrenheit? 65
That's 18.33deg Celsius.

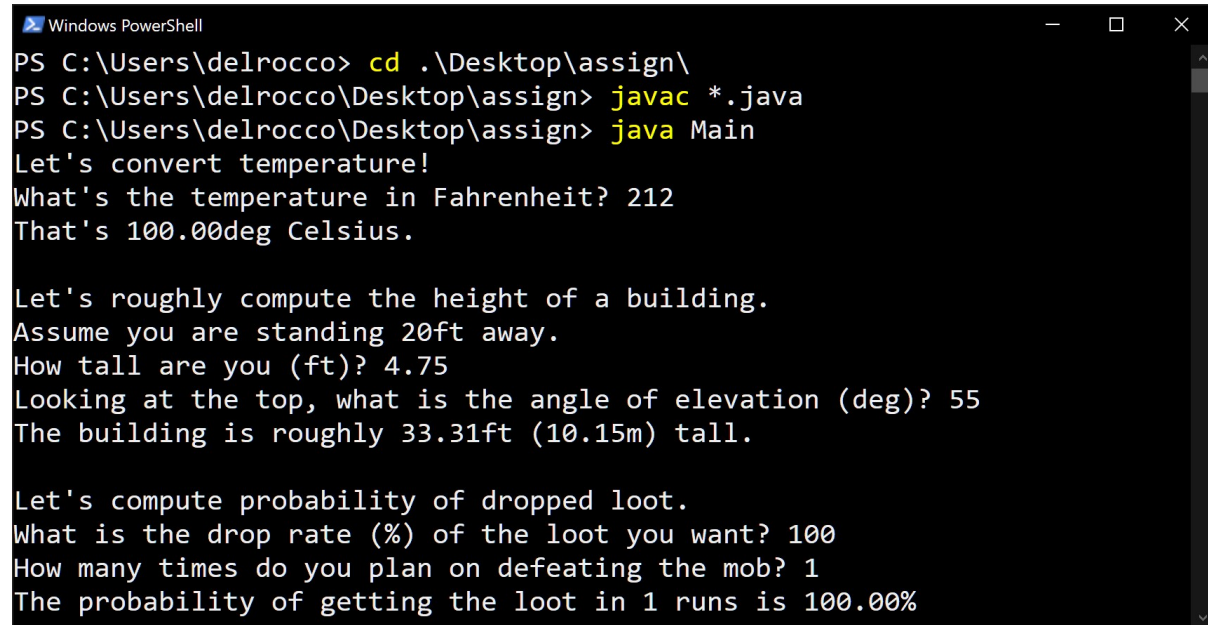
Let's roughly compute the height of a building.
Assume you are standing 20ft away.
How tall are you (ft)? 5.5
Looking at the top, what is the angle of elevation (deg)? 70
The building is roughly 60.45ft (18.42m) tall.

Let's compute probability of dropped loot.
What is the drop rate (%) of the loot you want? 1
How many times do you plan on defeating the mob? 100
The probability of getting the loot in 100 runs is 63.40%
```

```
Windows PowerShell
PS C:\Users\delrocco> cd .\Desktop\assign\
PS C:\Users\delrocco\Desktop\assign> javac *.java
PS C:\Users\delrocco\Desktop\assign> java Main
Let's convert temperature!
What's the temperature in Fahrenheit? 32
That's 0.00deg Celsius.

Let's roughly compute the height of a building.
Assume you are standing 20ft away.
How tall are you (ft)? 6
Looking at the top, what is the angle of elevation (deg)? 75
The building is roughly 80.64ft (24.58m) tall.

Let's compute probability of dropped loot.
What is the drop rate (%) of the loot you want? 0.7
How many times do you plan on defeating the mob? 150
The probability of getting the loot in 150 runs is 65.14%
```



```
Windows PowerShell
PS C:\Users\delrocco> cd .\Desktop\assign\
PS C:\Users\delrocco\Desktop\assign> javac *.java
PS C:\Users\delrocco\Desktop\assign> java Main
Let's convert temperature!
What's the temperature in Fahrenheit? 212
That's 100.00deg Celsius.

Let's roughly compute the height of a building.
Assume you are standing 20ft away.
How tall are you (ft)? 4.75
Looking at the top, what is the angle of elevation (deg)? 55
The building is roughly 33.31ft (10.15m) tall.

Let's compute probability of dropped loot.
What is the drop rate (%) of the loot you want? 100
How many times do you plan on defeating the mob? 1
The probability of getting the loot in 1 runs is 100.00%
```