Python exercises 1

v1

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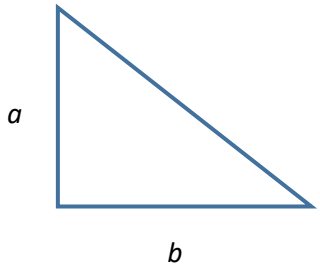
Exercises 1.1 to 1.3 are adapted from Rosalind http://rosalind.info/problems/locations/ which is a bioinformatics problem solving platform and a great way to learn as you develop your skills.

For these exercises develop your code to get the same output as the example shown, then repeat for the challenge which we will discuss with you.

1.1. Given a triangle



If *a* and *b* are integers, calculate the integer which is the **square** of the hypotenuse

So if *a* = 5 and *b* = 6, the answer = 61 (i.e. $5^2 + 6^2$)

Challenge: what is the answer if *a* = 10 and *b* = 12?

1.2. Given a string and two pairs of integers, return two slices of the string between the positions represented by the two number pairs inclusively.

So given a string "TheUniversityOfManchesterFacultyofBiologyMedicineAndHealth" and number pairs 3,13 and 15,25 the output will be:

University Manchester

Challenge: what is the output given the following string and number pairs 137,143 and 274,280?

```
GCTGAGACTTCCTGGACGGGGGACAGGCTGTGGGGTTTCTCAGATAACTGGGCCCCTGCGCTCAG
GAGGCCTTCACCCTCTGCTCTGGGTAAAGTTCATTGGAACAGAAAGAAATGGATTTATCTGCTCT
TCGCGTTGAAGAAGTACAAAATGTCATTAATGCTATGCAGAAAATCTTAGAGTGTCCCATCTGTC
TGGAGTTGATCAAGGAACCTGTCTCCACAAAGTGTGACCACATATTTTGCAAATTTTGCATGCTG
AAACTTCTCAACCAGAAGAAAGGGCCTTCACAGTGTCCTTTATGTAAGAATGATATAACCAAAAG
GAGCCTACAAGAAAGTACGAGATTTGAT
```

1.3. Given two positive integers *a* and *b*, return the sum of all odd integers from *a* to *b* **inclusively**.

So if *a* = 50 and *b* = 100 the output = 1875

Challenge: what is the output if *a* = 10 and *b* = 25?

1.4. Given a string representing a DNA sequence, print it in blocks, i.e. with gaps every so many bases.

So given sequence:

```
aggagtaagcccttgcaactggaaatacacccattg
```

an output with a block size of 3 should look like:

```
agg agt aag ccc ttg caa ctg gaa ata cac cca ttg
```

Challenge: output the following sequence with a block size of 10:

```
GCTGAGACTTCCTGGACGGGGGACAGGCTGTGGGGTTTCTCAGATAACTGGGCCCCTGCGCTCAG
GAGGCCTTCACCCTCTGCTCTGGGTAAAGTTCATTGGAACAGAAAGAAATGGATTTATCTGCTCT
TCGCGTTGAAGAAGTACAAAATGTCATTAATGCTATGCAGAAAATCTTAGAGTGTCCCATCTGTC
TGGAGTTGATCAAGGAACCTGTCTCCACAAAGTGTGACCACATATTTTGCAAATTTTGCATGCTG
AAACTTCTCAACCAGAAGAAAGGGCCTTCACAGTGTCCTTTATGTAAGAATGATATAACCAAAAG
GAGCCTACAAGAAAGTACGAGATTTGAT
```

1.5. Write code to transcribe a DNA sequence. So given sequence:

```
aggagtaagcccttgcaactggaaatacacccattg
```

the output will be:

```
aggaguaagcccuugcaacuggaaauacacccauug
```

Challenge: transcribe the following:

```
GCTGAGACTTCCTGGACGGGGGACAGGCTGTGGGGTTTCTCAGATAACTGGGCCCCTGCGCTCAGGAG
GCCTTCACCCTCTGCTCTGGGTAAAGTTCATTGGAACAGAAAGAAATGGATTTATCTGCTCTTCGCGT
TGAAGAAGTACAAAATGTCATTAATGCTATGCAGAAAATCTTAGAGTGTCCCATCTGTCTGGAGTTGA
TCAAGGAACCTGTCTCCACAAAGTGTGACCACATATTTTGCAAATTTTGCATGCTGAAACTTCTCAAC
CAGAAGAAAGGGCCTTCACAGTGTCCTTTATGTAAGAATGATATAACCAAAAGGAGCCTACAAGAAAG
TACGAGATTTGAT
```