Lecture 11: MATLAB Exercises

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Exercise 1

- Write a MATLAB m-file function (called `fact.m`) which takes a single argument (an integer), computes the factorial and returns the answer.

- Hint: For better performance, do *not* use loops!

Exercise 2

- Write a MATLAB m-file function (called `grades.m`) which accepts student grades as argument (*hint*: number array) and then determines the lowest, highest and average of such scores.

- E.g., `grades([11 10 99 5 19 3 17])`

- `Total: 7 scores`

- `Min value: 3`

- `Max value: 99`

- `Average value: 23.43`

Exercise 3

- Write a MATLAB m-file function (`dice.m`) which simulates one or more dice with each die giving values from 1 to 6.

- The program takes a single argument which is the number of dice.

- The output should contain the values of the dice and also the probability for this combination of dice to occur. The probability is expressed as a decimal value between 0 and 1 with five decimal points.

- E.g., Rolling 3 dice: 4 1 6 (Probability: 0.00463)
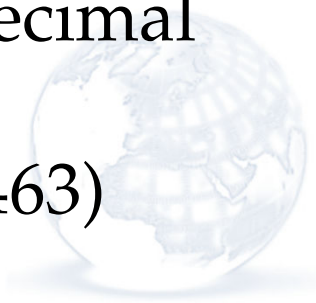
Exercise 4

- Write a MATLAB script (called `rev.m`) which reads a number of strings from standard input and prints them in reverse order on the command window.

- The input sequence is terminated with the string END.

- Hint: Use a cell array!

```
>> rev
one
two
three
END
-> three
-> two
-> one
```

Exercise 5

- Write a MATLAB script (called `count.m`) which reads a string from standard input and then counts the number of words in that string.

- E.g., "Everyone loves MATLAB" contains 3 words.

Exercise 6

- The sum of the squares of the first ten integers is:
- $1^2 + 2^2 + \dots + 10^2 = 385$
- The square of the sum of the first ten integers is:
- $(1 + 2 + \dots + 10)^2 = 55^2 = 3025$
- Hence the difference between the sum of the squares of the first ten integer numbers and the square of the sum is $3025 - 385 = 2640$.
- Find the difference between the sum of the squares of the first one hundred integer numbers and the square of the sum.

Exercise 7

- A prime number (or a prime) is an integer number greater than 1 that has no positive divisors other than 1 and itself.

- The first six prime numbers are: 2, 3, 5, 7, 11, and 13.

- We can see that the 6th prime is 13.

- Write a MATLAB script to print the first 50 prime numbers.

Exercise 8

- A Pythagorean triplet is a set of three positive integer numbers, $a < b < c$, for which: $a^2 + b^2 = c^2$

- For example, $3^2 + 4^2 = 9 + 16 = 25 = 5^2$.

- There exists exactly one Pythagorean triplet for which $a + b + c = 1000$.

- Write a MATLAB script to find this triplet.

Exercise 9

- Starting in the top left corner of a 2×2 grid, and only being able to move to the right and down, there are exactly 6 routes to the bottom right corner (see the figure below).

- How many such routes are there through a 10×10 grid?
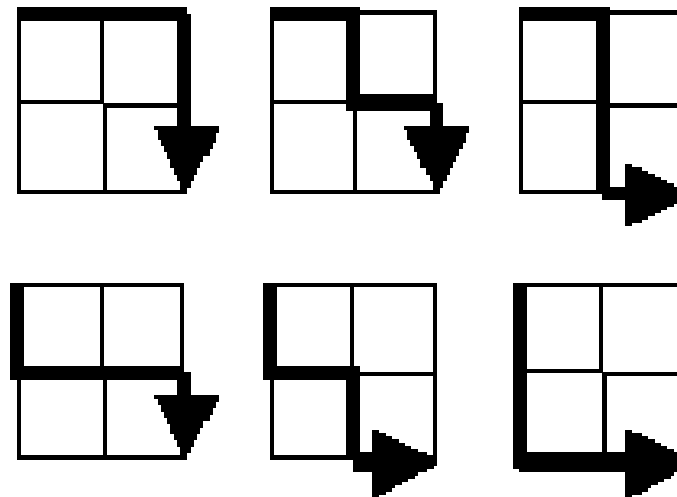
Exercise 10

- Write a MATLAB script file that asks the user to type the coordinate of two points: A and B (in a plane), and then displays the distance between A and B.

$$(3,4) \quad (2,2)$$
$$x_1 \; y_1 \quad x_2 \; y_2$$

$$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$= \sqrt{(2-3)^2+(2-4)^2}$$
$$= \sqrt{(-1)^2+(-2)^2} = \sqrt{1+4} = \sqrt{5} \approx 2.24$$