

MATLAB: Podpora vzdělávání (nejen) na VŠ



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Technical Computing Camp 2021

Martina Mudrová

HUMUSOFT

MartinaM@humusoft.cz

Campus-Wide licence v přehledu

Motto: „*MATLAB Access for Everyone, Anywhere*“

- ✦ Kompletní konfigurace produktů kromě certifikačních kitů
- ✦ MATLAB Parallel Server s neomezeným počtem procesů
- ✦ Další služby
 - ✦ Online Training Suite
 - ✦ MATLAB Online, Drive, Mobile
 - ✦ MATLAB Grader

- ✦ **Akademická licence** (není možné komerční využití)
- ✦ MATLAB může být nainstalován na všech počítačích školy
- ✦ Síťové instalace, Designated Computer instalace, Individual instalace
- ✦ Individuální instalaci mohou mít **všichni zaměstnanci i všichni studenti univerzity, a to i na svých soukromých osobních počítačích**

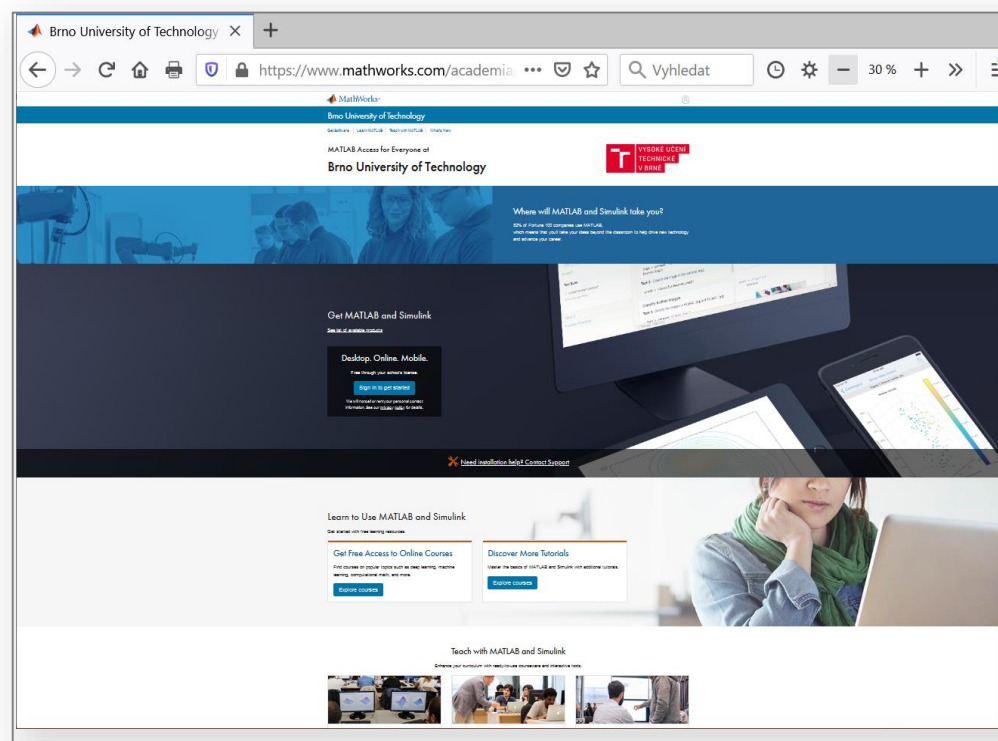


Přístup ke Campus-Wide licenci

prostřednictvím MATLAB Portálu příslušné univerzity

Např pro VUT:

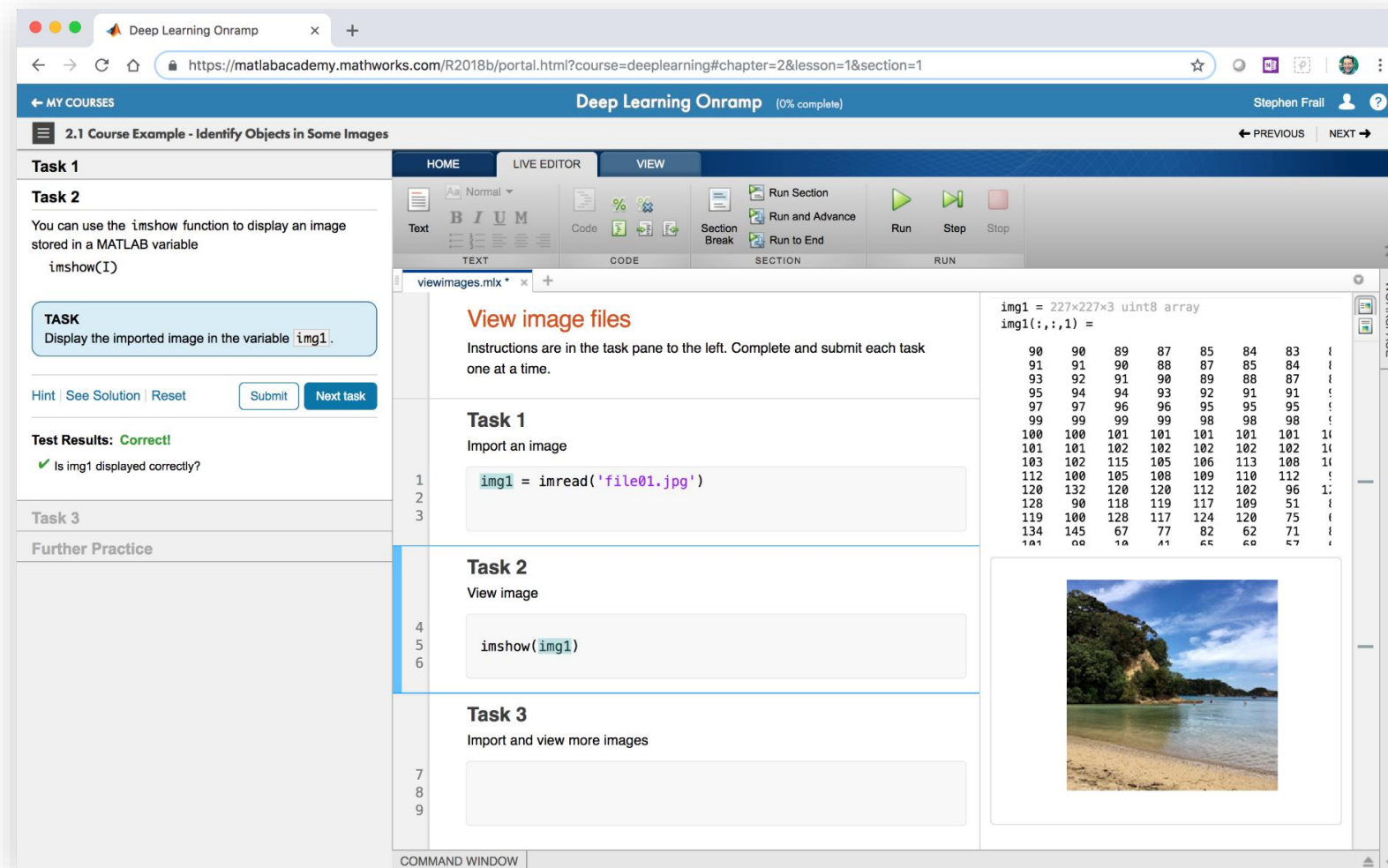
<https://www.mathworks.com/academia/tah-portal/brno-university-of-technology-31462990.html>



MATLAB Online Training Suite

(MATLAB Academy)

- Sada online kurzů
- K dispozici kdykoli a kdekoli – **postačuje počítač s webovým prohlížečem**
- **Vlastním tempem**, možnost kurz kdykoli přerušit
- Průběžné kvízy - **okamžitá zpětná vazba** k řešení úloh
- **Osvědčení** o absolvování (pdf nebo **online odkaz**)



The screenshot shows the MATLAB Academy interface for a course titled "Deep Learning Onramp". The user is logged in as Stephen Frail. The current task is "2.1 Course Example - Identify Objects in Some Images". The task pane on the left shows "Task 2" with instructions: "You can use the imshow function to display an image stored in a MATLAB variable" and the code `imshow(I)`. The task instructions also state: "Display the imported image in the variable `img1`". The test results show "Correct!" and "Is `img1` displayed correctly?".

The main workspace area shows the MATLAB editor with the following code:

```

1  img1 = imread('file01.jpg')
2
3
4
5  imshow(img1)
6
7
8
9











```

The workspace on the right shows the variable `img1` as a `227x227x3 uint8 array`. Below the workspace, there is a preview of the image being displayed, which is a landscape photo of a beach and trees.


<https://matlabacademy.mathworks.com/>

Aktuální přehled MATLAB online kurzů

Getting Started

 MATLAB Onramp <small>FREE</small>	 Simulink Onramp <small>FREE</small>
 Reinforcement Learning Onramp <small>FREE</small>	 Control Design Onramp with Simulink <small>FREE</small>
 Signal Processing Onramp <small>FREE</small>	 Stateflow Onramp <small>FREE</small>
 Deep Learning Onramp <small>FREE</small>	 Image Processing Onramp <small>FREE</small>
 Machine Learning Onramp <small>FREE</small>	 Simscape Onramp <small>FREE</small>

Data Science

 Deep Learning with MATLAB	 Machine Learning with MATLAB
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Core MATLAB

 MATLAB Fundamentals	 MATLAB for Data Processing and Visualization	 MATLAB Programming Techniques	 Image Processing with MATLAB <small>NEW</small>
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Computational Mathematics

 Solving Nonlinear Equations with MATLAB	 Solving Ordinary Differential Equations with MATLAB	 Introduction to Linear Algebra with MATLAB	 Introduction to Statistical Methods with MATLAB	 Introduction to Symbolic Math with MATLAB
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nejnovější:



Optimization Onramp

+ Kurz „Teaching with MATLAB“

<https://www.mathworks.com/learn/teaching-with-matlab.html>

<https://matlabacademy.mathworks.com/>

Cloudové služby v Campus-Wide licenci:



<https://matlab.mathworks.com>



MATLAB Online



5 GB pro každého z univerzity
<https://drive.matlab.com>

MATLAB Drive



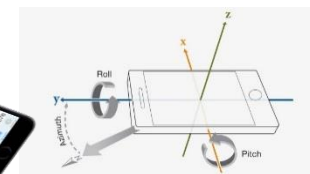
Desktop



MATLAB Mobile

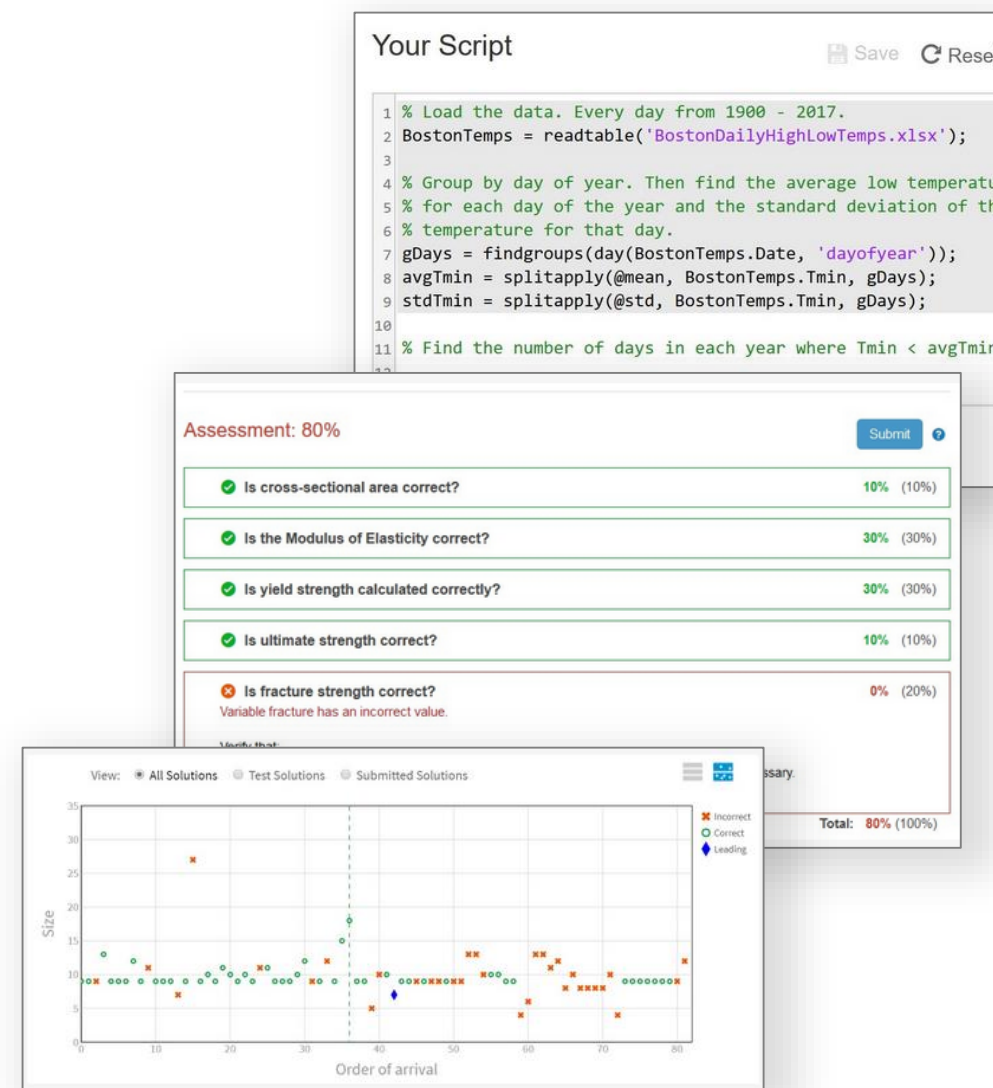
Android Sensors

iOS Sensors



MATLAB Grader v přehledu

- Interaktivní výuka
 - tvorba interaktivních úloh a jejich distribuce studentům
 - sdílení úloh s dalšími instruktory
- Automatizované hodnocení úloh
 - okamžitá zpětná vazba
 - analýza úspěšnosti (studenta, skupiny)
- Integrace s Learning Management System
 - Moodle (obecně splňující standardy LTI 1.1, 1.3, aj.)
- Připravené úlohy



The screenshot displays the MATLAB Grader interface. At the top, a 'Your Script' window shows MATLAB code for loading data from 'BostonDailyHighLowTemps.xlsx', grouping by day of year, and calculating average and standard deviation of minimum temperature. Below the script, an 'Assessment: 80%' summary shows a list of questions with their scores: 'Is cross-sectional area correct?' (10%), 'Is the Modulus of Elasticity correct?' (30%), 'Is yield strength calculated correctly?' (30%), 'Is ultimate strength correct?' (10%), and 'Is fracture strength correct?' (0%). The total score is 80% (100%). At the bottom, a scatter plot titled 'View: All Solutions' shows 'Size' on the y-axis (0 to 35) and 'Order of arrival' on the x-axis (0 to 80). The plot includes a legend for 'Incorrect' (red 'x'), 'Correct' (green circle), and 'Leading' (blue diamond). A vertical dashed line is drawn at order of arrival 35.

<https://grader.mathworks.com>

MATLAB Grader – připravené úlohy

Getting Started with MATLAB Grader

13 problems

Calculus I

Created By: MathWorks

10 problems

Digital Signal Processing

Created By: MathWorks

10 problems

System Dynamics and Control

Created By: MathWorks

10 problems

Dynamics

Created By: MathWorks

10 problems

Introduction to Programming

Created By: Eric Davishahl

111 problems

Calculus II

Created By: MathWorks

10 problems

Numerical Methods


Created By: MathWorks

10 problems

Symbolic Math Toolbox

Created By: MathWorks

10 problems



MATLAB Grader Martina Mudrova

CONTENTS Courses & Content LMS Integration Documentation & Support

< Back to Add Problem | **Digital Signal Processing** Close

fx Using DFT to compute convolutions Copy

hide details...

The DFT is often used to compute time-domain convolutions, but you must be careful to distinguish between linear convolution (which is usually what you want) and circular convolution (which is involved in DFT properties).

Write a function `dfcconv` that accepts three inputs:

- `h`: the first signal (e.g., an FIR filter)
- `x`: the second signal
- `N`: an integer greater than or equal to the length of `h` and `x`.

and return two outputs:

- `conv_circ`: the circular convolution of `h` and `x` using `N` points (i.e. using DFTs of length `N`)
- `conv_lin`: the linear convolution of `h` and `x` (using appropriately-sized DFTs)

Use the `dfc` and `idfc` functions in your solution. Do not use the `conv` and `conv` functions to compute the convolutions. Test your function using the test inputs in the 'Code to call your function' box.

Files Referenced
None

Problem Type
Function

Code
Reference Solution Learner Template

```

1 function [conv_circ, conv_lin] = dfcconv(h,x,N);
2
3 lx = length(x);
4 lh = length(h);
5
6 if N<max([lx lh])
7     error('N must be at least the length of the longer signal.')
8 end
9
10 % Compute order-N circular convolution based on length-N FFTs
11
12 conv_circ = ifft(fft(h,N).*fft(x,N));
13
14 % Compute linear convolution based on appropriate-length FFTs/zero padding
15
16 M = 1+lx+lh-1;
17 conv_lin = ifft(fft(h,M).*fft(x,M));

```

How to call the function (when the learner clicks 'Run')

```

1 h = [1 2 3];
2 x = [1 2 2 1];
3 [conv_circ,conv_lin] = dfcconv(h,x,4);

```

Assessment

- > **Test 1** Are the outputs correct for the test inputs? (Pretest)
MATLAB Code
- > **Test 2** Are the outputs correct for randomized inputs?
MATLAB Code

MATLAB CourseWare

Materiály pro podporu výuky v oblastech:

- Artificial Intelligence
- Biological and Health Sciences
- Business Economics and Finance
- Calculus
- Chemistry
- Controls
- Data Science
- Earth, Ocean, and Atmospheric Sciences
- Intro to Engineering
- Mechanical Engineering
- Neuroscience
- Physics
- Risk Management
- Robotics
- Signal Processing and Communications
- ...

Convolution in Digital Signal Processing Curriculum Module

Created with R2020b. Compatible with R2020b and later releases.

Description

This package contains *live scripts* and supporting data files centered around the fundamentals of convolution in digital signal processing. These materials are designed to be flexible and can be easily modified to accommodate a variety of teaching and learning methods. Used in a sequence, the live scripts progressively add depth to the topic. However, each script can be easily adapted for standalone use. We include a brief background, interactive illustrations, tasks, reflection questions, application examples, and guided exercises for the different concepts explored.

Suggested Prework

[MATLAB Onramp](#) – a free two-hour introductory tutorial to learn the essentials of MATLAB.

Details

convolutionBasics.mlx

Products: MATLAB, Signal Processing Toolbox

Learning Goals:

- Define and compute convolution of two 1-D signals
- Use FFT to compute 1-D convolution
- Define and compute circular convolution
- Achieve equivalence between circular and linear convolution

convolutionLTI.mlx

Products: MATLAB, Signal Processing Toolbox

Data files: *ringtone.wav*, *1st_baptist_nashville_balcony.wav*

Learning Goals:

- Identify the moving average operation as a simple LTI system
- Define an LTI system
- Compute the output of an LTI system for an arbitrary input signal given its impulse response

convolutionFilters.mlx

Products: MATLAB, Signal Processing Toolbox, Image Processing Toolbox (optional), Deep Learning Toolbox (optional)

Data files: *lettert.png*, *flower.jpg*

Learning Goals:

- Explain the frequency domain implications of convolving two signals in the time domain
- Apply convolution to perform low pass filtering of signals
- Define and compute convolution of two 2-D signals
- Perform spatial filtering of images to achieve effects such as blurring and embossing

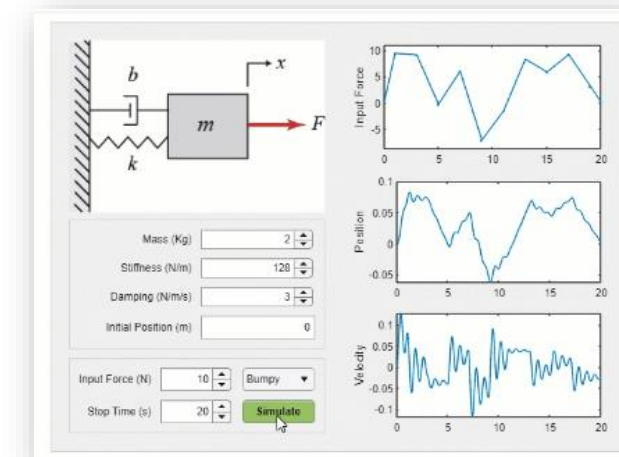
practiceExerciseSols.mlx

This script contains completed solutions for all the practice problems.

Příklady, LiveScripty, Curricula, Videá, Knihy, Virtual. labs, Apps, Články, Odkazy ...

Další zdroje pro výuku / samostudium / inspiraci

- Pro učitele: Kurz *Teaching with MATLAB*
<https://www.mathworks.com/learn/teaching-with-matlab.html>
- Virtuální laboratoře, vzdálený přístup k HW, domácí projekty
<https://www.mathworks.com/academia/online-teaching/virtual-labs.html>



- Materiály pro podporu online výuky (LiveScripts,...)
<https://www.mathworks.com/academia/online-teaching/instructional-resources.html>

- Convolution in Digital Signal Processing
- Descriptive Statistics and Probability Distributions
- Vector Arithmetic

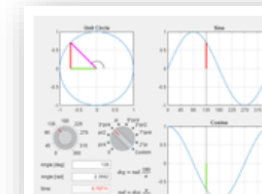
• ...

- Distance Learning Community 

<https://www.mathworks.com/matlabcentral/topics/distance-learning.html>

- File Exchange

<https://www.mathworks.com/matlabcentral/fileexchange>



Unit Circle - Sine and Cosine Functions

version 1.0 (176 KB) by [Michal Blaho](#)

Visualization of sine and cosine function values inside unit circle

PASS licence

(Primary and Secondary School) = multilicence pro SŠ

Obsahuje

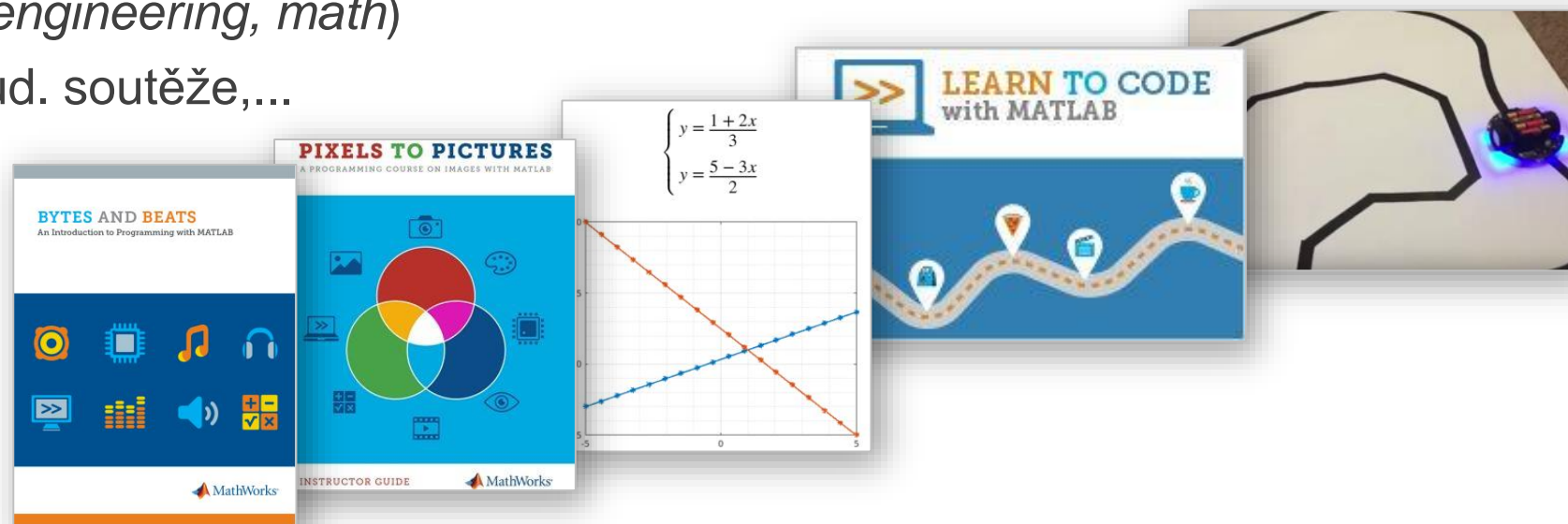
- MATLAB + Simulink + >50 nadstaveb
- MATLAB Online

Využití

- STEM (*science, technology, engineering, math*)
- HW projekty (Arduino, ...), stud. soutěže,...

CourseWare pro věk 10+

- „*Bytes and Beats*“,
- „*Pixels to Pictures*“,
- „*Discover Robotics*“,
- a další...



<https://www.mathworks.com/academia/highschool.html>

Zítora:

Ukázka použití MATLAB Grader

Anna Tooháčková (*učitel*)

a

Martina Mudrová (*student*)