lab_index

September 3, 2017

1 Laboratories

Basic structure:

- lab_intro.ipynb: http://localhost:8888/notebooks/lab_intro.ipynb Getting started, Jupyter, Git, Numpy, Matplotlib. Tasks involve calculating with numpy arrays and plotting (basic, subplot, complex, 3d).
- lab_symintro.ipynb: http://localhost:8888/notebooks/lab_symintro.ipynb Symbolic math with sympy, basic and advanced differentiation, symbolic plotting and integration. Tasks involve symbolic plotting, roots, differentiation, and integration.
- lab_taylorexp.ipynb (optional): http://localhost:8888/notebooks/lab_taylorexp.ipynb Basic Taylor expansion for symbolic expression. Tasks involve plotting approximation for different orders.
- lab_newtonm.ipynb (optional): http://localhost:8888/notebooks/lab_newtonm.ipynb Newton's method for finding roots of symbolic equation. Tasks involve basic application, and also considering higher-order Taylor expansion.
- lab_symdiffeq.ipynb: http://localhost:8888/notebooks/lab_symdiffeq.ipynb Symbolic first-order RC lowpass step response. Task requires plotting second-order RLC.
- lab_symdiffeq2.ipynb (optional): http://localhost:8888/notebooks/lab_symdiffeq2.ipynbINCOMPLETE
- lab_symfseries.ipynb: http://localhost:8888/notebooks/lab_symfseries.ipynb Using symbolic math to calculate Fourier series coefficients, and lambda functions for numerical reconstruction plots. Symbolic functions defined using "Piecewise" and integrated.
- lab_reconstruct.ipynb: http://localhost:8888/notebooks/lab_reconstruct.ipynb Representing continuous-time signal from samples. Reconstruction using interpolation on regular spacing, and using a RBF with coefficients estimated from samples. Tasks involve interpolation with different kernels and fitting a polynomial model.
- lab_convolution.ipynb: http://localhost:8888/notebooks/lab_convolution.ipynb Requires reconstruct. Convolution of bandlimited continuous-time signals with discrete-time processing.

- lab_discdiffeq.ipynb: http://localhost:8888/notebooks/lab_discdiffeq.ipynb Euler methods for numerical approximate step response of first-order lowpass RC circuit.
- lab_discdiffeq2.ipynb (optional): http://localhost:8888/notebooks/lab_discdiffeq2.ipynbINCOMPLETE
- lab_bodeplot.ipynb: http://localhost:8888/notebooks/lab_bodeplot.ipynb Basic plotting of first-order lowpass response, justifying log-log scales. Task requires plotting second-order.
- lab_freqresprclp.ipynb: http://localhost:8888/notebooks/lab_freqresprclp.ipynb*INCOMPLETE* Requires discdiffeq and bodeplot. Check task 3 in lab? Change to RC=0.001 and modify frequency range? But then can't see transients.

Scratch:

- lab_symdelta.ipynb: http://localhost:8888/notebooks/lab_symdelta.ipynb
- lab_sym_scratch.ipynb: http://localhost:8888/notebooks/lab_sym_scratch.ipynb

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