Eratta

The following list contains corrections to be applied to MATLAB Programming for Engineers at the first re-printing. **Corrections are shown in red below.**

[Pages 113-114, Exercise 3.11] **Output Power from a Motor** The output power produced by a rotating motor is given by the equation

$$ P = \tau_{\text{IND}} \omega_m $$

(3-10)

where $\tau_{\text{IND}}$ is the induced torque on the shaft in newton-meters, $\omega_m$ is the rotational speed of the shaft in radians per second, and $P$ is in watts. Assume that the rotational speed of a particular motor shaft is given by the equation

$$ \omega_m = 188.5(1 - e^{-0.2t}) \text{ rad/s} $$

and the induced torque on the shaft is given by

$$ \tau_{\text{IND}} = 10e^{-0.2t} \text{ N \cdot m} $$

Plot the torque, speed, and power supplied by this shaft versus time for $0 \leq t \leq 10$ s. Be sure to label your plot properly with the symbols $\tau_{\text{IND}}$ and $\omega_m$.

Create two plots, one with the power displayed on a linear scale, and one with the output power displayed on a logarithmic scale. Time should always be displayed on a linear scale.

[Page 153, Exercise 4.14] Write a MATLAB program to evaluate the function

$$ y(x) = \ln \frac{1}{1-x} $$

for any user-specified value of $x$, where $\ln$ is the natural logarithm (logarithm to the base $e$). Write the program with a **while** loop, so that the program repeats the calculation for each legal value of $x$ entered into the program. When an illegal value of $x$ is entered, terminate the program. [Any $x \geq 1$ is considered an illegal value.]
Current Through a Diode  The current flowing through the semiconductor diode shown in Figure 4-4 is given by the equation

\[ i_D = I_o \left( \frac{q v_D}{kT} - 1 \right) \]  

(4-13)

where \( i_D \) = the voltage across the diode, in volts  
\( v_D \) = the current flow through the diode, in amps  
\( I_o \) = the leakage current of the diode, in amps  
\( q \) = the charge on an electron, \( 1.602 \times 10^{-19} \) coulombs  
\( k \) = Boltzmann’s constant, \( 1.38 \times 10^{-23} \) joule/K  
\( T \) = temperature, in kelvins (K)

The leakage current \( I_o \) of the diode is 2.0 \( \mu \)A. Write a program to calculate the current flowing through this diode for all voltages from -1.0 V to +0.6 V, in 0.1 V steps. Repeat this process for the following temperatures: 75 °F and 100 °F, and 125 °F. Create a plot of the current as a function of applied voltage, with the curves for the three different temperatures appearing as different colors.

Use the Help Desk to look up information about the standard MATLAB function sortrows, and compare the performance of sortrows with the sort-with-carry function created in the previous exercise. To do this, create two copies of a \( 1000 \times 2 \) element array containing random values, and sort column 1 of each array while carrying along column 2 using both functions. Determine the execution times of each sort function using tic and toc. How does the speed of your function compare with the speed of the standard function sortrows?
[Page 201, Exercise 5.19] Use function `random0` to generate a set of three arrays of random numbers. The three arrays should be 100, 1000, and 2000 elements long. Then, use functions `tic` and `toc` to determine the time that it takes function `ssort` to sort each array. How does the elapsed time to sort increase as a function of the number of elements being sorted? (Hint: On a fast computer, you will need to sort each array many times and calculate the average sorting time in order to overcome the quantization error of the system clock.)

[Page 251, Exercise 6.5] Write a function that will accept a complex number `c`, and plots that point on a Cartesian coordinate system with a circular marker. The plot should include both the `x` and `y` axes, plus a vector drawn from the origin to the location of `c`.

[Page 252, Exercise 6.11] Create a mesh, surface plot, and contour plot of the function \( z = e^{x+y} \) for the interval \(-1 \leq x \leq 1\) and \(-2\pi \leq y \leq 2\pi\). In each case, plot the real part of \( z \) versus \( x \) and \( y \).

[Page 252, Exercise 6.17] MATLAB includes functions `upper` and `lower`, which shift a string to upper case and lower case respectively. Create a new function called `caps`, which capitalizes the first letter in each word, and forces all other letters to be lower case. (Hint: Take advantage of functions `upper`, `lower`, and `isspace`.)

[Page 325, Exercise 8.8] **Table of Sines and Cosines** Write a program to generate a table containing the sine and cosine of \( \theta \) for \( \theta \) between \(0^\circ\) and \(90^\circ\), in \(1^\circ\) increments. The program should properly label each of the columns in the table.
[Page 349, Exercise 9.3] Write a program that modifies the default figure color to orange and the default line width to 3.0 points. Then create a figure plotting the ellipse defined by the equations

\[ x(t) = 10 \cos t \]
\[ y(t) = 6 \sin t \]

[Page 414, Exercise 10.9] Modify the temperature conversion GUI of Exercise 10.8 to allow you to adjust the displayed temperature by clicking the mouse. (Warning: This exercise requires material not discussed in this chapter. Refer to the WindowsButtonDownFcn property of figure objects and the CurrentPoint property of axis objects in the on-line MATLAB documentation.)