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

$$P = \tau_{\text{IND}}\, \omega_m \qquad (3\text{-}10)$$

where τ_{IND} is the induced torque on the shaft in newton-meters, ω_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

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

and the induced torque on the shaft is given by

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

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

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

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 $x \ge 1$ is considered an illegal value.]

[Pages 153-154, Exercise 4.15]**Current Through a Diode** The current flowing through the semiconductor diode shown in Figure 4-4 is given by the equation

$$i_D = I_o\left(e^{\frac{qv_D}{kT}} - 1\right) \qquad (4\text{-}13)$$

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, 1.602×10^{-19} coulombs

k = Boltzmann's constant, 1.38×10^{-23} joule/K

T = temperature, in kelvins (K)

The leakage current I_O of the diode is 2.0 μA. 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.

[Page 197, Exercise 5.11]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 1000×2 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 $z = e^{x+iy}$ for the interval $-1 \le x \le 1$ and $-2\pi \le y \le 2\pi$. In each case, plot the real part of 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 θ for θ between 0° and 90°, in 1° 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.)