

Chapter 2 Corrections – updated 112506

Page 45; replace the first paragraph of section 2.3 by the following:

“A well-known guide to problem solving in the mathematical and physical sciences is the book of Polya (1945) entitled “How to Solve It.” George Polya (1887 – 1985) was a Hungarian – American mathematician. The book deals with problem solving in general and recommends four steps:

1. The *first* step is to understand the problem. To accomplish this the problem solver must study the problem carefully, understand the definitions employed, ascertain what is to be determined (the unknown(s)), what is known or given, and what the restrictions or conditions are upon the outcome. It is recommended that a diagram be drawn in the first step, and that a notation be introduced. At least one free object diagram or a balance diagram of a physical quantity that is conserved (e.g., force, moment, mass, or energy) is usually most helpful. Be prepared to revise notation as the solution to the problem develops; the problem will appear simpler when the most efficient notation is introduced.
2. The *second* step is to devise a plan to solve the problem, that is to say, to connect the known(s) or given(s) to the unknown(s). It is at this point that Polya recommends that you review your experience with problems to determine if you have ever seen a problem similar to the one that is before you. If a plan of solution does not emerge in your mind, try to restate the problem. Reformulate the knowns, unknowns and the conditions or restrictions of the problem.
3. The *third* step is to execute your plan of solution. Try to verify each step of your analysis or calculation.
4. The *fourth* step is an examination of the solution obtained, a double check. Does the answer make sense? Can the result be verified in a different way? If the result is changed by a small amount, does the answer still make sense? Are the dimensions of the results correct?”

Page 51; In the second line of the caption to Figure 2.6, replace “ N_x , N_y and N_x ” by N_x , N_y and N_z .”

Page 54; Replace the caption to Figure 2.9 by the following:

“Figure 2.9 Illustration of forces acting on the forearm-hand. This figure is related to Problem 2.6.1. Note that the elbow joint is at the location “E” and the force F_M represents the muscle force and that the muscle itself is also sketched in the figure. Modified from Chaffin and Andersson (1991).”

Page 68; Replace the solution to Example 2.8.2 by the following:

“**Solution:** (a) The requirement that this system function isometrically is $L_1 + L_2 = L_{o1} + L_{o2}$. (b) The equation governing the series spring is $k(L_2 - L_{o2}) = T$. (c) The total tension $T(t)$ is given by $\eta(dL_1/dt) + M(t) = T$. (c) The differential equation governing the tension $T(t)$ in the muscle

model is $(\eta/k)(dT/dt) + T = M(t)$. (d) From part (c) above the differential equation for $T(t)$ due to this contraction is $\frac{dT}{dt} + 2T = 2h(t)\sin t - 2h(t - \pi)\sin t$. The Laplace transform of this differential equation is $s\bar{T}(s) - T(0) + 2\bar{T}(s) = \frac{2(1 + e^{-\pi s})}{(1 + s^2)}$. The solution to the Laplace transform of this differential equation using the initial condition $T(0) = 0$ is $\bar{T}(s) = \frac{2(1 + e^{-\pi s})}{(2 + s)(1 + s^2)}$ and the inverse solution is given by

$$T(t) = \frac{2}{5}[e^{-2t} - \cos t + 2 \sin t + (e^{2(\pi-t)} + \cos t - 2 \sin t)h(t - \pi)].$$

This expression is plotted in above in Figure 2.23(b)."

Page 72; Figure 2.26; replace the existing caption by: Figure 2.26. The lunge stretch considered in Problem 2.6.9. This illustration was created by Sinan Simsek and is reproduced with his permission.

Page 88; Add another transform to the very short table of Laplace transforms:

Transform function	Object function	Conditions
$(1/s)(e^{-as})$	$h(t - a)$ (Heaviside step function)	$a \geq 0$

Table 2A.1 A very short table of Laplace transforms

Page 91; Appendix 2B, second equation from the end - replace " τ_x " by " τ_x " thus the last term " Ce^{-t/τ_x} " becomes " Ce^{-t/τ_x} ".

Page 91; last line of Appendix 2B, replace "(2.10)" by "(2.11)."