King Fahd University of Petroleum & Minerals
Chemical Engineering Department
CHE 501 – Advanced Transport Phenomena
First Semester, 2013 - 2014 (131)

HW#1
Due: Sun. 22-Sep.-2013

Solve the following problems from your textbook:

1. 2B.7 (a, b and c)
2. 2B.10
3. 2C.4
4. 10B.1
5. 10B.10
6. 10D.1
7. 18B.2
8. 18B.5
9. 18B.7

The following trick is useful for 18B.5 :

The following nonlinear BVP can be solved analytically by the following change of variable method:

$$\frac{d^2y}{dx^2} - a\,y^2 = 0$$

Let: $u(y) = \frac{dy}{dx}$

$$\Rightarrow u(y) = \frac{d^2y}{dx^2} = \frac{du}{dx} = \frac{du}{dy}\frac{dy}{dx} = u\frac{du}{dy}$$

$$\Rightarrow \frac{d^2y}{dx^2} - a\,y^2 = 0 \qquad \text{converted to simple 1st order ODE} \qquad u\frac{du}{dy} = a\,y^2$$