

1 PE 3013 - Exam 2

Open Book, open notes, closed neighbor; no cell phones or internet access until you complete the exam. Save your file as **Your_Name_Exam2.xlsm** and e-mail the results to *lgt@utulsa.edu*; **copy yourself** to make sure that the attachment came. **Save your file before you try to run or debug! Example results are in the shares folder - see Exam2_Template.xlsm.** (Make sure to save your file as a Macro Enabled Worksheet).

Be Sure to Indent and Comment your Code

Students in Section 1 will not be allowed to leave the room until 8:55am.

(Sample results are provided in the template file.)

Riazi and Daubert developed a simple two-parameter equation for predicting the critical properties and/or Molecular weight of heavy hydrocarbon component mixtures (i.e., C₇₊). Their correlation requires that the user know the specific gravity of the hydrocarbon liquid, γ (water = 1), and either its molecular weight M lbm/lbmole or its boiling point, T_b , °R. The correlation is of the form

$$\theta = a (\exp (b\theta_1 + c\theta_2 + d\theta_1\theta_2)) \theta_1^e \theta_2^f \quad (1)$$

where the constants a, b, c, d, e and f are given by

θ	θ_1	θ_2	a	b	c	d	e	f
T_c	T_b	γ	10.6643	$-5.1747E-4$	-0.54444	$3.5995E-4$	0.81067	0.53691
T_c	M	γ	554.4	$-1.3478E-4$	-0.61641	0	0.2998	1.0555
P_c	T_b	γ	$6.162E6$	$-4.725E-3$	-4.8014	$3.1939E-3$	-0.4844	4.0846
P_c	M	γ	$4.5203E4$	$-1.8078E-3$	-0.3084	0	-0.8063	1.6015
M	T_b	γ	581.96	$5.43076E-4$	-9.53384	$1.11056E-3$	0.97476	6.51274

For example, to use equation 1 to compute critical pressure, P_c given specific gravity, γ , and boiling point, T_b one would use Eq. 1 with

$$\theta = P_c, \quad \theta_1 = T_b \text{ and } \theta_2 = \gamma \quad (2)$$

Write a *single* function that takes as arguments T_b, M, γ , an integer argument indicating the calculation type, (i.e., whether we want to calculate T_c, P_c or M) and an integer or boolean argument indicating whether we are inputting boiling point, T_b or Molecular weight, M .

You are free to choose what your function would look like, but one possibility is:

```
Public Function RiaziDaubert(Tb as double, M as double, SG as double,
    CalcType as integer, TbGiven as Boolean) as Double
```

where, for example, you could have

$$\text{CalcType} = \begin{cases} 0 & \text{for calculating } T_c \\ 1 & \text{for calculating } P_c \\ 2 & \text{for calculating } M \end{cases}$$