This is NOT a group project. While discussion with other students is encouraged, all work submitted for credit, however, must be your own. Any evidence of plagiarism or other forms of scholastic dishonesty will be grounds for a failing grade in the course.

Problem Statement

Psychrometry deals with the properties of moist air. When the atmospheric pressure (total pressure) P (kPa), the air dry bulb temperature T (° C), and the relative humidity RH (%) are known, the following properties can be calculated:

$$P_s = 0.00008\,T^3 - 0.0007\,T^2 + 0.0754\,T + 0.4875 \quad \ldots\ldots\ldots\ldots \text{ (kPa)}$$

$$P_v = RH\left(\frac{P_s}{100}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(kPa)}$$

$$w = 0.622\,\frac{P_v}{P - P_v} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \left(\frac{kg_{vapor}}{kg_{dry\,air}}\right)$$

$$\mu = 100\,\frac{P_v}{P_s}\left[\frac{P - P_s}{P - P_v}\right] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(\%)}$$

$$h = 1.005T + w(2500 + 1.88T) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ (kJ/kg}_{dry\,air}\text{)}$$

where

P_s = saturation pressure of water at dry bulb temperature T

P_v = partial pressure of water vapor

w = humidity ratio

μ = percentage saturation

h = specific enthalpy of air-vapor mixture

Write a Fortran program to tabulate the following properties for $2^o C \le T \le 50^o C$ in increment of $2^o C$, and $30 \le RH \le 100$ in increment of 10 :

- P_v
- w
- μ
- h

Tabulate for P = 101.325 kPa and P = 90 kPa.

Task

Refer http://www.fkm.utm.my/~mohsin/scsj2273/project/w.pdf for a sample of tabulated property.

Be creative when tabulating the properties!

Project report submission

1. This project report must be presented in a standard technical report format. The content must include introduction, flowchart, results (program output) and discussion including program verification, and conclusion.
2. Fully commented source codes of the computer programs developed for the project must also be handed in. No mark will be given if the program softcopy is not submitted.
3. Report, code and relevant files must be zipped into a single file and submitted by email to me at mohsin@utm.my
4. Please include the following statement in the first page of the project submission. No mark will be given if this statement is not included.

I, *full name,* hereby declare that this project submission is a product of my own effort. I acknowledge that academic disciplinary action can be taken if this submission is a result of plagiarism or other form of scholastic dishonesty.

Yours Truly,
Your signature and date