Universiti Malaysia PAHANG
Engineering • Technology • Creativity

# NUMERICAL METHODS & OPTIMISATION

## Linear Algebraic Equations Tutorial

### Raihana Edros
### Faculty of Engineering Technology
rzahirah@ump.edu.my

Communitising Technology

# Chapter Description

- Aims
  - Apply numerical methods in solving engineering problem and optimisation

- Expected Outcomes
  - Apply linear algebraic equations to solve engineering problems

- References
  - Steven C. Chapra and Raymond P. Canale (2009), Numerical Methods for Engineers, McGraw-Hill, 6th Edition

# Application in engineering problem: Class activity

The followings are amounts of secret ingredients W, X, Y, Z in Medicine A for a project conducted by a group of researchers in a renowned pharmaceutical company in a different dosage forms:

| Dosage forms | Total weight | W (mg) | X (mg) | Y (mg) | Z (mg) |
|---|---|---|---|---|---|
| Syringe | 72.54 | $6.52x_1$ | 5.49 | 0.83 | 7.44 |
| Spray | 66.81 | $8.47x_1$ | 4.37 | 0.62 | 6.15 |
| Capsule | 8.23 | $7.35x_1$ | 6.79 | 0.78 | 6.87 |
| Patches | 75.64 | $5.21x_1$ | 4.97 | 0.69 | 7.13 |

Determine the portions of W, X, Y, Z (as given by $x_1, x_2, x_3, x_4$) of Medicine A if the corresponding total weight is to be achieved for each dosage form. Suggest which method would you use to solve this problem?

Ans: ($x_1$) 1.07045 ($x_1$) 0.022968 ($x_3$) 6.874533 ($x_4$) 2.848045

Linear Algebraic Equation: Tutorial
By Raihana Edros
http://ocw.ump.edu.my/course/view.php?id=608&notifyeditingon=1

# Conclusion

- Linear algebraic equations can be used to solve simultaneous equations in engineering problems

**Main Reference**

**Steven C. Chapra and Raymond P. Canale (2009), Numerical Methods for Engineers, McGraw-Hill, 6th Edition**

**Any enquiries kindly contact:**
**Raihana Edros, PhD**
**rzahirah@ump.edu.my**