Indoor Air Quality Engineering

Today, we will:

- Introduce the course and instructor: John M. Cimbala, 863-2739, jmc6@psu.edu
- Briefly go over the course website at www.mne.psu.edu/me405
- Show some hints about using Excel, EES, and Mathcad to solve simultaneous equations
- Begin introductory lecture material (Chapter 1)
- Do some example problems

Example

Given: 3 simultaneous equations:

\[
\begin{align*}
3a + b - 2c &= 4 \\
4a - 3b + 2c &= 0 \\
2a &= -4c = 5
\end{align*}
\]

(a) To do: Calculate \(a\), \(b\), and \(c\).

Solution: I will show how to do this in Excel, EES, and Mathcad.

\[
\begin{align*}
\text{Ans:} & \\
a &= 0.6364 \\
b &= 0.2273 \\
c &= -0.9318
\end{align*}
\]

Do demos in class

Set \(R\) as \(0\):

\[
\begin{align*}
3a + b - 2c - 4 &= 0 \\
4a - 3b + 2c &= 0 \\
2a - 4c - 5 &= 0
\end{align*}
\]

CH. 1 INTRODUCTION READ

Sec. 1.1 - 1.2 Hazard vs. Risk
Hazard = Potential for producing an undesirable event (qualitative)

Risk = Probability of ... (quantitative)

We will work with Risks in this course.

E.g. See Tables 1.1 to 1.3

#death & death rates

Table 1.5 = Risk of death

\[
\text{Risk} = \frac{\text{# deaths per year}}{\text{# people engaged in the activity}}
\]

e.g. motor vehicle accidents

Table 1.1 \rightarrow \text{# death} = 43,458 \ (1997)

\text{# people} = 260,000,000

\[
\text{Risk} = \frac{43,458}{260 \times 10^6} = 1.7 \times 10^{-4} \quad \text{in} \ 1997
\]

Table 1.5 (1992) \rightarrow \text{Risk} = 2.4 \times 10^{-4}

Risk of pedestrian being killed by a car is \( 4.2 \times 10^{-5} \)

\( \geq \frac{1}{24,000} \)
Compare to rule of drinking water with EPA limit of chloroform

\[ \text{Risk} = 6 \times 10^{-7} \]

Compare to \( 4.2 \times 10^{-5} \) ped/person/car day

EPA is extremely conservative.

Get familiar with Acronyms

\underline{NIOSH} National Institute for Occupational Safety & Health

\underline{OSHA} Occupational Safety & Health Administration

\underline{MSDS} = Material Safety Data Sheet

See the "Links" tab on the course website

(Can download MSDS's for free off the Internet at the NIOSH site)

We will use MSDS's a lot in this course!