AE4233 MDO Tutorial 2
Interactive demo MDF and IDF Schemes

1) Write down your objective function
2) Write down all your design variables
3) Write down bounds/constraints
4) **MDF**: Think about how to implement the consistency between y1 and y2 (e.g. the system coordinator). See block diagrams previous slides.
5) **IDF:** Same as 4 but now with surrogate variables. See block diagrams previous slides.

Start the implementation in MATLAB:

a) Write a separate function file for your Objective function. This function returns the objective J(x) and takes the design vector x as input.

   For example:

```
function [J] = Objective(x)

..{MATLAB Expressions}..


J = …

end
```

b) Write a separate function file for your constraints, this function takes as input the design vector ***x*** and returns the inequality constraint vector ***c*** and equality constraint vector ***ceq***:

   For example:

```
function [c ceq] = Constraints(x)

..{MATLAB Expressions}..

c = [ c1 c2 c3 c4 …]
ceq = [] ;

end

% Note: if no inequality constraints:  c = [ ] ;
% Note: if no equality constraints ceq = [] ;
```

c) Write your main .m file to start the optimization. Define the initial design vector ***x*** and the bounds.

For example:

```
clc;
clear all;
close all ;

x0 = [ ….]      % initial design vector
LB = […]        % lower bounds
UB = […]        % upper bounds

% Choose an active set algorithm and display iterations
(optional)

options = optimset('Algorithm','active-
set','Display','Iter') ;

% Start optimization

[x,fval,exitflag] = fmincon(@(x)
Objective(x),x0,[],[],[],[],LB,UB,@(x)
…Constraints(x),options)

% Note that for this exercise, there are no linear equality
and inequality constraints so those entries are left blank:
[],[],[],[]
```