Lab exercises
Degree in mechanical engineering
AY 2014-15
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`Padova, 21st March 2017`

second day of spring

Functions declaration and call in Matlab

- In Matlab, to define a function, say `fun.m` we proceed as follows

```
function [o1,...,oM]=fun(i1,..., iN)
%--------------------
%function body
%--------------------
return
```

where `i1,...,iN` are input parameters and `o1,...,oM` are the output ones.

- Suppose now that `f.m` is a file containing the function $f(x) = x^2 \sin x$, that is

```
function [y]=f(x)
  y=x.^2.*sin(x);
return
```

Let `x` be given. The command `y=feval(@f,x)` is equivalent to `y=f(x)`.

Therefore, both are equivalent commands

Solve the following problems

1. **Build an M-function, `pigreco.m`, that computes the recursive sequence**

$$\begin{aligned} z_1 &= 2 \\ z_n &= 2^{n-1/2}\sqrt{1-\sqrt{1-4^{1-n}z_{n-1}^2}}, \quad n \geq 2 \end{aligned}$$

which should converge to π as $n \to \infty$. The output will be the sequence `z`. Then, on the calling M-script, plot the relative errors. Is the sequence a stable method to compute π?

2. **Build another function for the recursive sequence**

$$\begin{aligned} z_1 &= 2 \\ z_n &= \sqrt{2}\frac{z_{n-1}}{\sqrt{1+\sqrt{1-4^{1-n}z_{n-1}^2}}}, \quad n \geq 1 \end{aligned}$$

The output will be as before the sequence z. Then, on the calling M-script, plot the relative errors. Is this sequence a stable method to compute π?.