

CALCOLO NUMERICO
 Corso di Laurea in Ingegneria Biomedica
 A.A. 2016/2017 – Correzione 09/01/2018

NOME	COGNOME	MATRICOLA
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Esercizio 1

1. Si ha $\det(A_n) = \det(A_n^T)$ e A_n^T è una matrice di Vandermonde costruita su n nodi a due a due distinti.

2. Vale

$$\begin{bmatrix} p_0^{(j)} & p_1^{(j)} & \dots & p_{n-1}^{(j)} \end{bmatrix} A_n = [L_j(x_1), L_j(x_2), \dots, L_j(x_n)] = \mathbf{e}_j^T.$$

3. Si ha $\|A_n\|_\infty \geq 1$ e

$$\|A_n^{-1}\|_\infty \geq |p_0^{(n+1)/2}| = \prod_{j=1}^{(n-1)/2} \frac{j}{\frac{n+1}{2} - j} \prod_{j=(n+3)/2}^n \frac{j}{j - \frac{n+1}{2}} = \frac{\frac{n+3}{2} \dots n}{1 \dots \frac{n-1}{2}} = \binom{n}{\frac{n+1}{2}}.$$

4. `function[x]=ing_15_02_2018_1(n, j, t)`

```

p=1;
for i=1:j-1
    p=p*((t-i)/(j-i));
end
for i=j+1:n
    p=p*((t-i)/(j-i));
end
x=p;

```

5. `function[s]=ing_15_02_2018_2(y, t)`

```

n=length(y);
s=0;
for i=1:n
    s=s+y(i)*ing_15_02_2018_1(n,i,t);
end

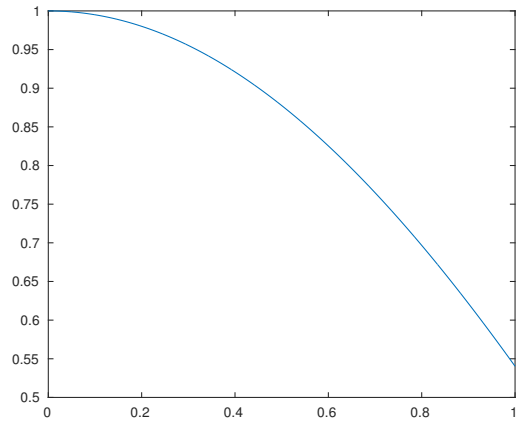
```

6. Lo script

```

for k=1:21
    x(k)=k/21;
    y(k)=cos(x(k));
end
t=linspace(0,21,1000);
for j=1:1000
    s(j)=ing_15_02_2018_2(y,t(j));
end
plot(t/21, s);

```



genera il seguente grafico