

TNA005: Tillämpad matematik i teknik och naturvetenskap

Examination: UPG9 Introduktion till MATLAB

Datum: 2021-08-20

Namn: förnamn efternamn

Personnummer: yyyyymmdd-xxxx

LiU-ID: abcde???

Klass: ???

Uppgift 1

Förklara din kod antingen här, eller som kommentarer i kod-blocken.

```
% Skriv din kod här:  
clear  
% a  
% rand1 tar ints 1 - 4  
n = 4 + randi(4)
```

```
n =  
6
```

```
A = zeros(n)
```

```
A = 6×6  
    0    0    0    0    0    0  
    0    0    0    0    0    0  
    0    0    0    0    0    0  
    0    0    0    0    0    0  
    0    0    0    0    0    0  
    0    0    0    0    0    0
```

```
for i = 1:n  
    for j = 1:n  
        A(i, j) = 1/(i+j-1);  
    end  
end  
A
```

```
A = 6×6  
    1.000000000000000    0.500000000000000    0.333333333333333    0.250000000000000    ...  
    0.500000000000000    0.333333333333333    0.250000000000000    0.200000000000000  
    0.333333333333333    0.250000000000000    0.200000000000000    0.166666666666667  
    0.250000000000000    0.200000000000000    0.166666666666667    0.142857142857143  
    0.200000000000000    0.166666666666667    0.142857142857143    0.125000000000000  
    0.166666666666667    0.142857142857143    0.125000000000000    0.111111111111111
```

```
% b
```

```
r = rand(n, 1)
```

```
r = 6×1  
0.049654430325742  
0.902716109915281  
0.944787189721646  
0.490864092468080  
0.489252638400019  
0.337719409821377
```

```
b = A*r
```

```
b = 6×1  
1.092794667624518  
0.789889937433145  
0.625106784561228  
0.519225761634965  
0.444844526390009  
0.389501064464335
```

```
b
```

```
b = 6×1  
1.092794667624518  
0.789889937433145  
0.625106784561228  
0.519225761634965  
0.444844526390009  
0.389501064464335
```

```
x = A\b
```

```
x = 6×1  
0.049654430326029  
0.902716109907530  
0.944787189772145  
0.490864092340184  
0.489252638538424  
0.337719409767666
```

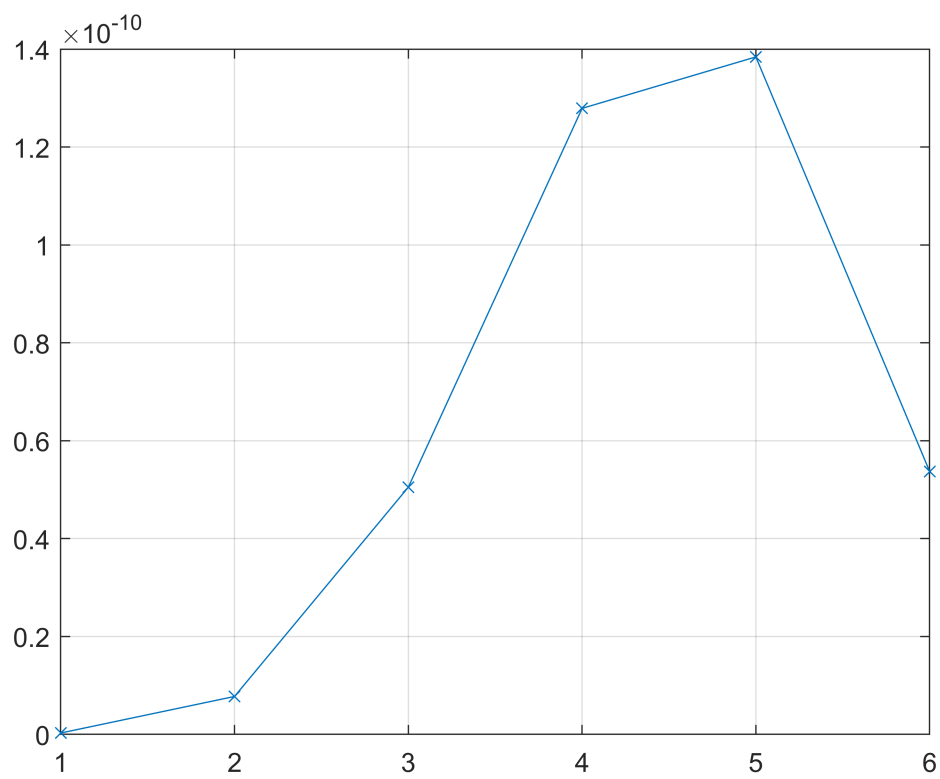
```
diff = abs(x - r)
```

```
diff = 6×1  
10-9 x  
0.000287159185319  
0.007750911024118  
0.050499271431192  
0.127895916079979  
0.138405065186475  
0.053711646241794
```

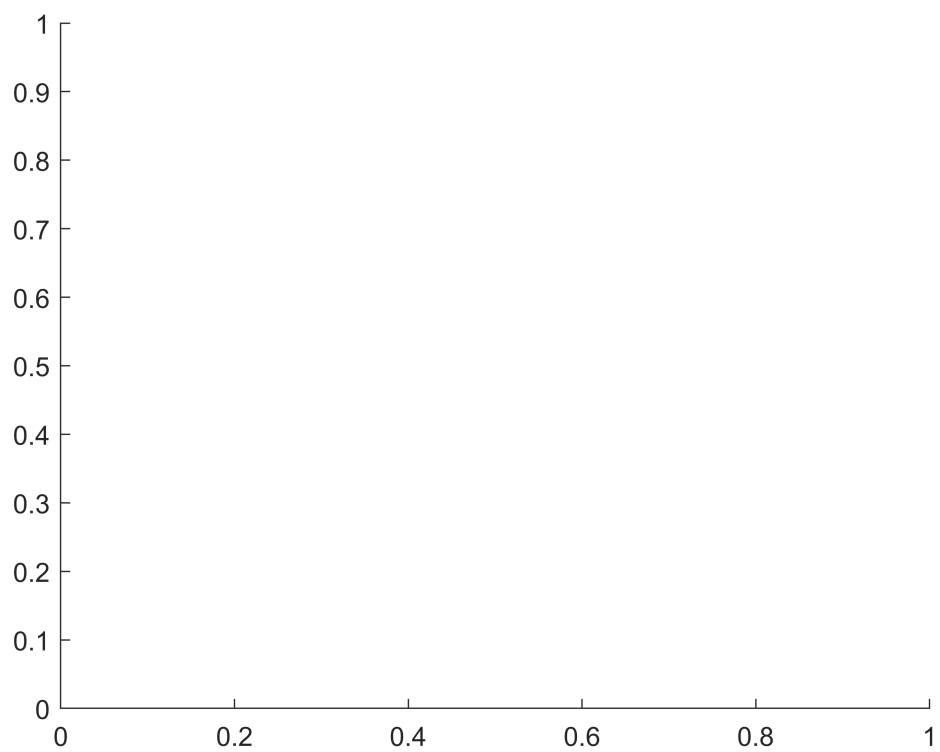
```
[maxAvikelse, indAvvikelse] = max(diff)
```

```
maxAvikelse =  
1.384050651864754e-10  
indAvvikelse =  
5
```

```
plot(diff, '-x');  
grid on
```



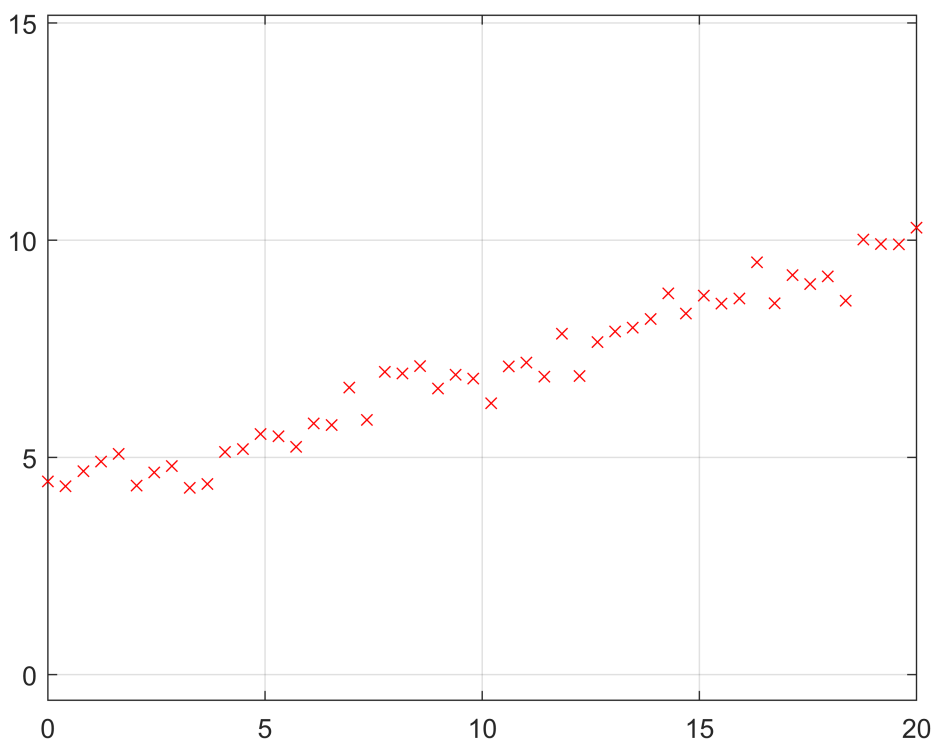
clf
cla



Uppgift 2

Förklara din kod antingen här, eller som kommentarer i kod-blocken.

```
% Skriv din kod här:  
clear  
%hold off  
load('data20210820.mat')  
plot(x, y, 'rx')  
axis equal  
grid on
```



```
% Förklara koden  
% Dra slutsater och  
% svara på ställda frågor,
```

```
xm = mean(x)
```

```
xm =  
10
```

```
ym = mean(y)
```

```
ym =  
6.978131009792241
```

```
Sxx = sum((x-xm).*(x-xm))
```

```
Sxx =  
1.734693877551021e+03
```

```
Sxy = sum((x - xm) .* (y - ym))
```

```
Sxy =  
5.090698116838000e+02
```

```
beta = Sxy/Sxx
```

```
beta =  
0.293463773794191
```

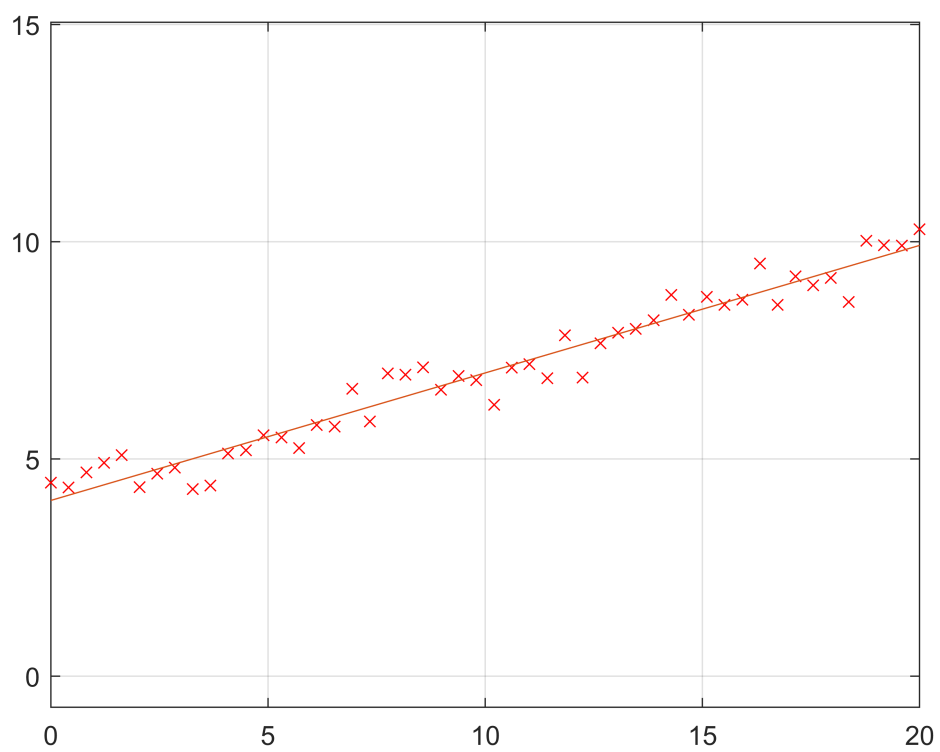
```
alpha = ym - beta*xm
```

```
alpha =  
4.043493271850336
```

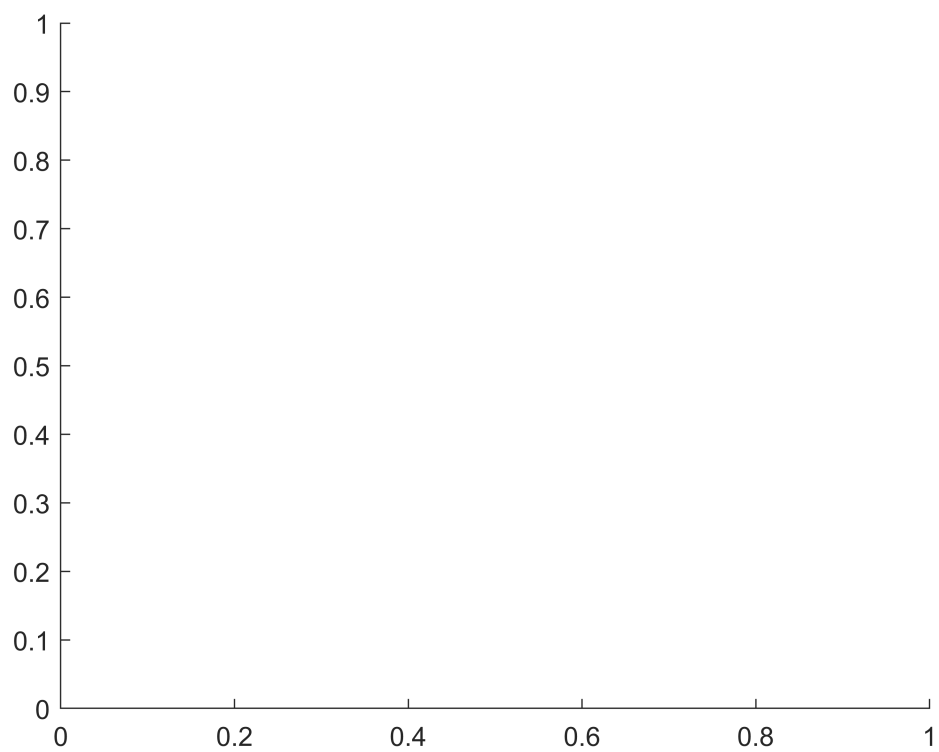
```
linje = alpha + beta*x
```

```
linje = 50x1  
4.043493271850336  
4.163274404011230  
4.283055536172124  
4.402836668333018  
4.522617800493912  
4.642398932654807  
4.762180064815700  
4.881961196976595  
5.001742329137489  
5.121523461298382  
⋮
```

```
hold on  
plot(x, linje, '-')
```



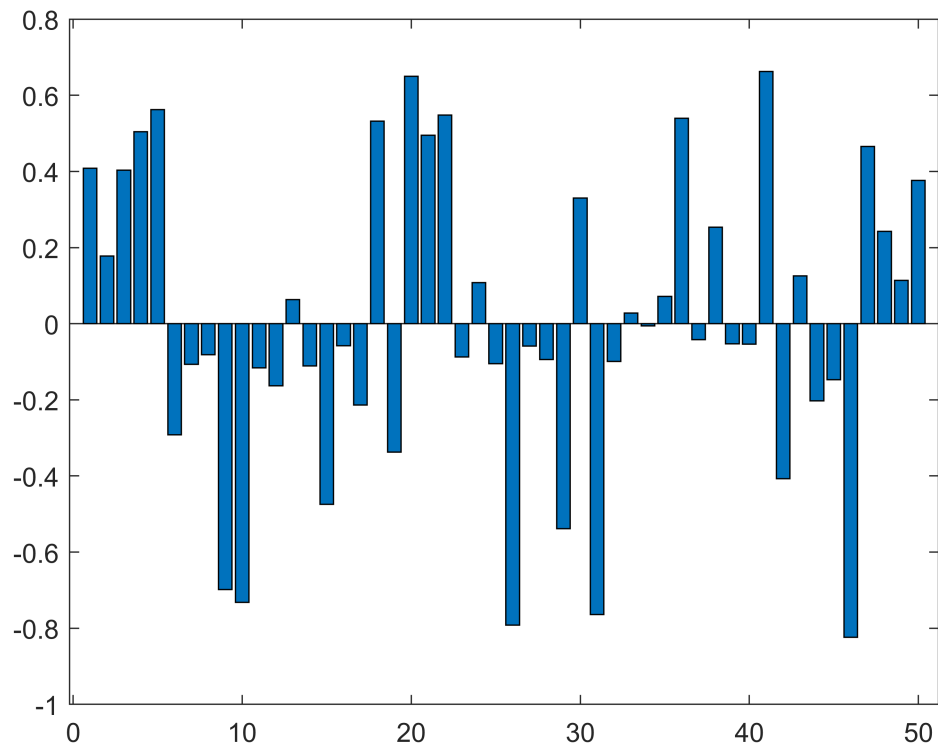
clf
cla



```
% c  
ei = y - linje
```

```
ei = 50x1  
0.408033366895252  
0.177539483919713  
0.403201780287630  
0.503956385115190  
0.562262491902233  
-0.291784103757393  
-0.106638518671696  
-0.081784679507847  
-0.698141409817623  
-0.732382098221367  
⋮
```

```
bar(ei)
```



Uppgift 3

Förklara din kod antingen här, eller som kommentarer i kod-blocken.

```
clear  
n = 9 + randi(11)
```

```
n =  
19
```

```
fun = @(x) sin(x)
```

```
fun = function_handle with value:  
    @(x)sin(x)
```

```
a = 0
```

```
a =  
    0
```

```
b = pi
```

```
b =  
    3.141592653589793
```

```
I = duggaFunc(fun, a, b, n)
```

```
I =  
    1.995441318320194
```

```
fel = abs(I - 2)
```

```
fel =  
    0.004558681679806
```

```
clear  
fun = @(x) sin(x);  
a = 0;  
b = pi;  
n = 10;  
I = duggaFunc(fun, a, b, n);  
while abs(2 - I) > 1e-7  
    n = n + 1;  
    I = duggaFunc(fun, a, b, n);  
end  
n
```

```
n =  
    4056
```

```
format long  
I
```

```
I =  
    1.999999900010917
```

```
abs(2 - I)
```

```
ans =  
    9.998908279129637e-08
```