EÐL207G

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pure data

```
u = symunit;
nm = double(separateUnits(unitConvert(u.nm, u.m)));
cm = double(separateUnits(unitConvert(u.cm, u.m)));
mm = double(separateUnits(unitConvert(u.mm, u.m)));
uA = double(separateUnits(unitConvert(u.uA, u.A)));

rulercmW = 705; % 8cm -29cm = 21cm
pix2mm = rulercmW/2100*mm;
```

tilraun 1

```
findMidl1 = @(p) p(ceil(end/2));
cntr1pix2mm = @(p) (p-findMidl1(p))*pix2mm;

tilraun1 = [62 255 374 490 682];
tilraun1 = cntr1pix2mm(tilraun1)

err = (1*mm + pix2mm)*ones(1,5);
```

```
tilraun1 =
  Columns 1 through 3
   -104.742857142857e-003   -39.9500000000000e-003    0.00000000000000e+000
  Columns 4 through 5
    38.9428571428571e-003    103.400000000000e-003
```

tilraun 2

```
findMidl2 = @(p) (p(end/2)+p(end/2+1))/2;
cntr2pix2mm = @(p) (p-findMidl2(p))*pix2mm;
```

```
tilraun2_025 = [266 293 320 346 376 400 427 454];
tilraun2_025 = cntr2pix2mm(tilraun2_025)

tilraun2_025 =
  Columns 1 through 3
   -31.8928571428571e-003   -22.8285714285714e-003   -13.7642857142857e-003
  Columns 4 through 6
   -5.03571428571429e-003    5.03571428571429e-003    13.0928571428571e-003
  Columns 7 through 8
    22.1571428571429e-003    31.2214285714286e-003

tilraun2_05 = [327 342 356 369 382 395];
tilraun2_05 = cntr2pix2mm(tilraun2_05)

tilraun2_05 =
  Columns 1 through 3
   -11.9178571428571e-003   -6.88214285714286e-003   -2.18214285714286e-003
  Columns 4 through 6
    2.18214285714286e-003    6.54642857142857e-003    10.9107142857143e-003
```

trash

```
tilraun2_075 = [235 279 326 406 448 493];
tilraun2_075 = cntr2pix2mm(tilraun2_075)

tilraun2_075 =
  Columns 1 through 3
   -43.9785714285714e-003   -29.2071428571429e-003   -13.4285714285714e-003
  Columns 4 through 6
    13.4285714285714e-003    27.5285714285714e-003    42.6357142857143e-003

tilraun2_1 = [172 221 270 371 421 468];
tilraun2_1 = cntr2pix2mm(tilraun2_1)

tilraun2 = {tilraun2_025', tilraun2_05' , tilraun2_075' , tilraun2_1'}

tilraun2_1 =
  Columns 1 through 3
   -49.8535714285714e-003   -33.4035714285714e-003   -16.9535714285714e-003
  Columns 4 through 6
    16.9535714285714e-003    33.7392857142857e-003    49.5178571428571e-003
tilraun2 =
  1x4 cell array
    {8x1 double}    {6x1 double}    {6x1 double}    {6x1 double}
```

tilraun 3

```
tilraun3 = [59 159 259 456 553 648];
tilraun3 = cntr2pix2mm(tilraun3)

tilraun3 =
```

```
  Columns 1 through 3
   -100.210714285714e-003   -66.6392857142857e-003   -33.0678571428571e-003
  Columns 4 through 6
    33.0678571428571e-003    65.6321428571429e-003    97.5250000000000e-003
```

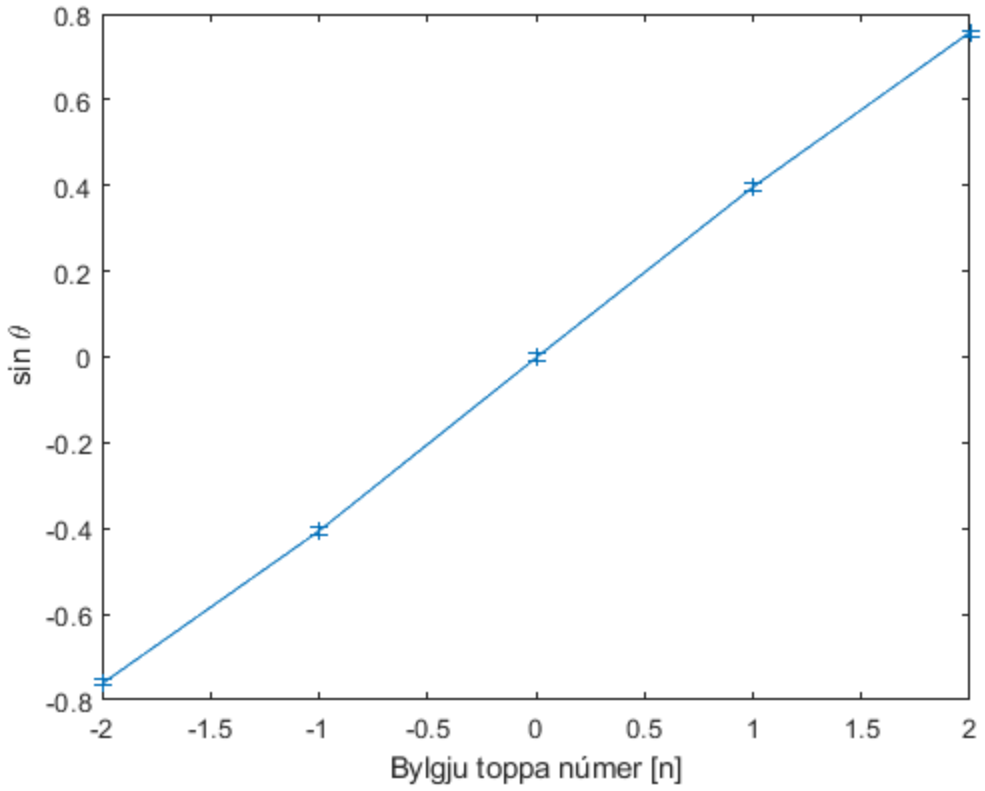
tilraun 4

```
degMarker = 0:10:180;
tilraun4 = [109.08 78.6 50.15 26.72 10.38 3.16 5.4 17.79 38.97 64.81 95.38
 121.48 164.36 164.14 171 169.45 157.37 138.72 112.17]*uA;
```

Tilraun 1 útreikningar

```
L = 9*cm;
Lerr = 0.1*cm;
d = 1880*nm;

n = -2:2;
% skrifað
% x_n = [ 9.1 3.55 0 -3.5 -9.3 ]*cm;
% x_nerr = 0.05*cm;

% pixle mælt-
slopeError = @(z,w,zerr,werr) -polyfit([z(1)-zerr(1) z(end)+zerr(end)],
[w(1)+werr(1) w(end)-werr(end)],1) + polyfit([z(1)+zerr(1) z(end)-zerr(end)],
[w(1)-werr(1) w(end)+werr(end)],1);

sin_thFind = @(x,l) x.*(l^2 +x.^2).^-0.5;
sin_therrFind = @(x,l,xerr,lerr)
 l*(l^2*lerr^2+x.^2.*xerr.^2).^0.5.*(x.^2+l^2).^-1.5;


sin_th = sin_thFind(tilraun1,L)
sin_therr = sin_therrFind(tilraun1,L,err,Lerr)

figure
errorbar(-2:2, sin_th,sin_therr,sin_therr,zeros(1,5),zeros(1,5))

xlabel("Bylgju toppa númer [n]")
ylabel('sin \theta')

b = abs([sin_th(1)-sin_th(5)  sin_th(2)-sin_th(4)])
c = [4       2 ];
berr = [(sin_therr(1)^2+sin_therr(5)^2)^0.5
 (sin_therr(2)^2+sin_therr(4)^2)^0.5];
hrough = d*b./c
hrougherr = d./c.*berr

htrue = polyfit(n, d*sin_th, 1);
htrue = htrue(1)
htrueerr = slopeError(n,d*sin_th,zeros(1,5), d*sin_therr)
```

```
lambda = d.*sin_th./n
lambdaerr = d./n.*sin_therr

sin_th =
  Columns 1 through 3
   -758.467419877006e-003   -405.714401757031e-003    0.00000000000000e+000
  Columns 4 through 5
    397.116792491347e-003    754.291339383777e-003
sin_therr =
  Columns 1 through 3
    5.68479415056302e-003    9.86303365242739e-003    11.1111111111111e-003
  Columns 4 through 5
    9.92066249720475e-003    5.75949389548982e-003
b =
    1.51275875926078e+000    802.831194248377e-003
hrough =
    710.996616852568e-009    754.661322593475e-009
hrougherr =
    3.80347785212968e-009    13.1498903518182e-009
htrue =
    719.729558000750e-009
htrueerr =
    10.7576307632898e-009    140.435520462133e-012
lambda =
  Columns 1 through 3
    712.959374684386e-009    762.743075303218e-009                      NaN
  Columns 4 through 5
    746.579569883732e-009    709.033859020751e-009
lambdaerr =
  Columns 1 through 3
   -5.34370650152924e-009   -18.5425032665635e-009                      Inf
  Columns 4 through 5
    18.6508454947449e-009    5.41392426176043e-009
```



hrough er best

```
lambda = hrough(1);
lambdaerr = hrougherr(1);
```

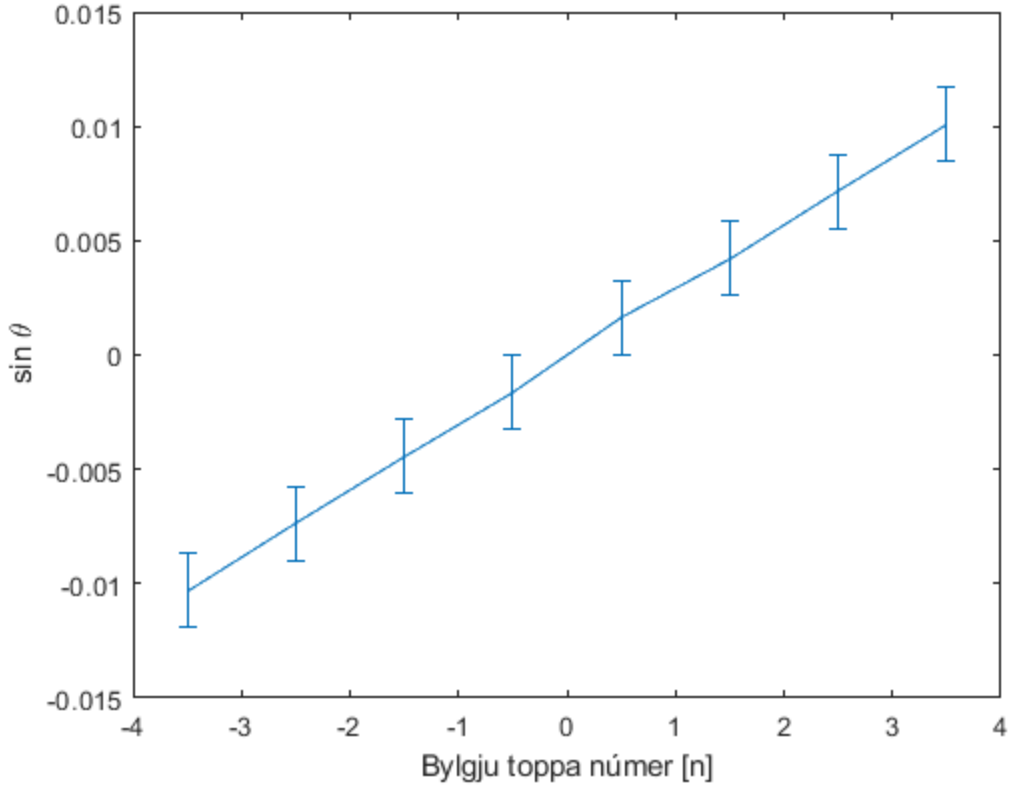
Tilraun 2 útreikningar

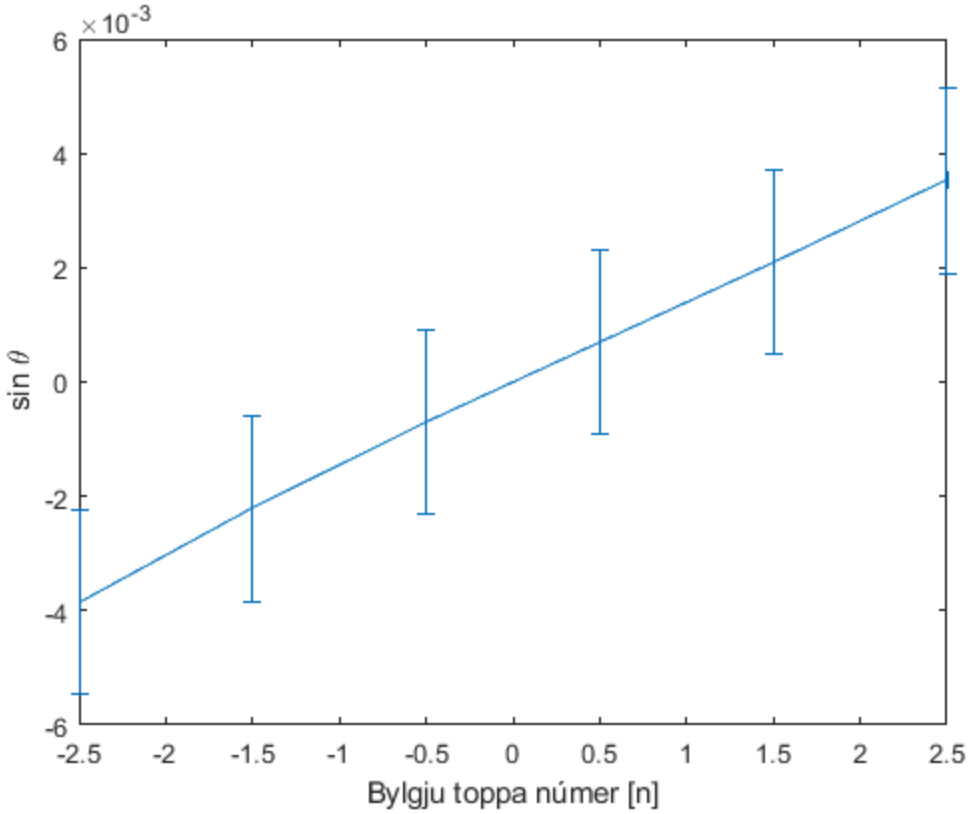
```
L = 310*cm;
Lerr = 0.5*cm;


drough = zeros(1,4);
drougherr = zeros(1,4);

c = [8 6 6 6]

for index = 1:4
 sin_k = sin_thFind(tilraun2{index},L)
 sin_kerr = sin_therrFind(tilraun2{index}, L,(1*mm +
 pix2mm)*ones(length(tilraun2{index}),1),Lerr)
 b = sin_k(end) - sin_k(1)
 berr = (sin_kerr(1)^2+sin_kerr(end)^2)^0.5
 drough(index) = lambda/(b/c(index));
 drougherr = drough*(berr/b);
end
```

```
sinerrr = sin_therrFind(tilraun2{1}, L,(1*mm +
 pix2mm)*ones(length(tilraun2{1}),1),Lerr);
figure
errorbar(-3.5:3.5,sin_thFind(tilraun2{1},L),sinerrr,sinerrr,zeros(1,8),zeros(1,8))
xlabel("Bylgju toppa númer [n]")
ylabel('sin \theta')

sinerrr = sin_therrFind(tilraun2{2}, L,(1*mm +
 pix2mm)*ones(length(tilraun2{2}),1),Lerr);
figure
errorbar(-2.5:2.5,sin_thFind(tilraun2{2},L),sinerrr,sinerrr,zeros(1,6),zeros(1,6))
xlabel("Bylgju toppa númer [n]")
ylabel('sin \theta')


drough
drougherr

c =
  Columns 1 through 3
    8.00000000000000e+000    6.00000000000000e+000    6.00000000000000e+000
  Column 4
    6.00000000000000e+000
sin_k =
   -10.2874740173660e-003
    -7.36385563383941e-003
    -4.44004839962830e-003
    -1.62442181991091e-003
     1.62442181991091e-003
     4.22346463529410e-003
     7.14728287613613e-003
     10.0709178192853e-003
sin_kerr =
     1.61265327771236e-003
     1.61277515553937e-003
     1.61285666539155e-003
     1.61289699361383e-003
     1.61289699361383e-003
     1.61286109698057e-003
     1.61278257782556e-003
     1.61266368974903e-003
b =
     20.3583918366513e-003
berr =
     2.28064349917986e-003
sin_k =
    -3.84444163586047e-003
    -2.22004061210485e-003
    -703.916876296136e-006
     703.916876296136e-006
     2.11174644341982e-003
     3.51956345426215e-003
sin_kerr =
     1.61286831913012e-003
```

```
    1.61289158548871e-003
    1.61290205553605e-003
    1.61290205553605e-003
    1.61289269342477e-003
    1.61287396947908e-003
b =
    7.36400509012263e-003
berr =
    2.28094424663928e-003
sin_k =
   -14.1852085544442e-003
   -9.42124084471140e-003
   -4.33175659366125e-003
    4.33175659366125e-003
    8.87983421716450e-003
    13.7521556206124e-003
sin_kerr =
    1.61242800692225e-003
    1.61269359729782e-003
    1.61285890888090e-003
    1.61285890888090e-003
    1.61271699784238e-003
    1.61245657813359e-003
b =
    27.9373641750566e-003
berr =
    2.28033775872644e-003
sin_k =
   -16.0797180673159e-003
   -10.7747201242788e-003
   -5.46881222701791e-003
    5.46881222701791e-003
    10.8829960068817e-003
    15.9714648523087e-003
sin_kerr =
    1.61229260297919e-003
    1.61262904109315e-003
    1.61283258976068e-003
    1.61283258976068e-003
    1.61262350296366e-003
    1.61230079656610e-003
b =
    32.0511829196246e-003
berr =
    2.28013185939522e-003
drough =
  Columns 1 through 3
    279.392055151452e-006    579.301568766891e-006    152.698002373617e-006
  Column 4
    133.098978337657e-006
drougherr =
  Columns 1 through 3
    19.8760441326075e-006    41.2117071140690e-006    10.8629868966524e-006
  Column 4
```

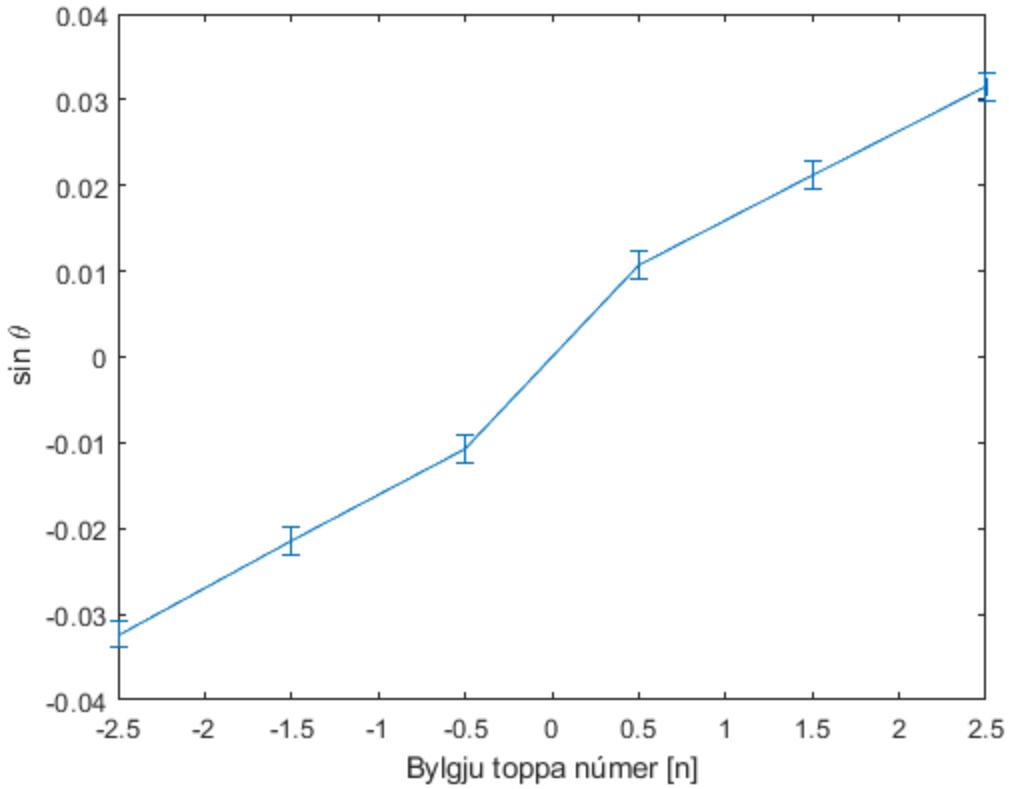
9.46870577980532e-006





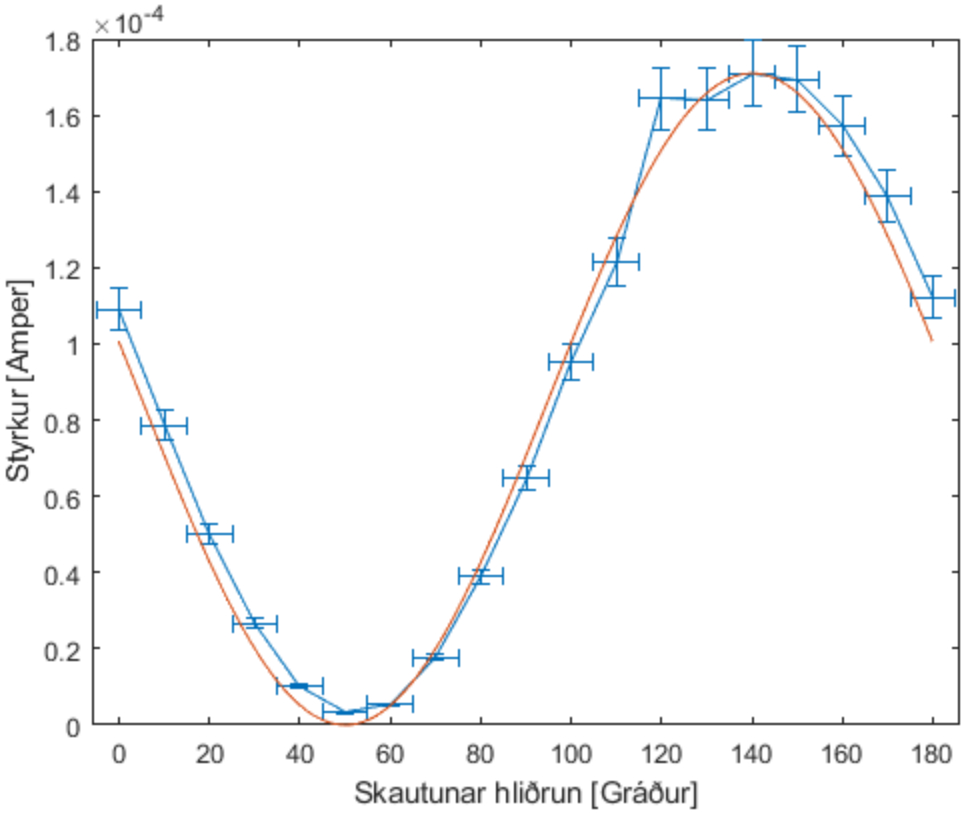
tilraun 3 útreikningar

```
sin_th = sin_thFind(tilraun3,L);
sin_therr = sin_therrFind(tilraun3,L,(1*mm +
 pix2mm)*ones(1,length(tilraun3)),Lerr);
b = sin_th(end)-sin_th(1)
berr = (sin_therr(1)^2+sin_therr(end)^2)^0.5
droughhar = lambda/(b/6)
droughharerr = droughhar*(berr/b)

figure
errorbar(-2.5:2.5,sin_th,sin_therr,sin_therr,zeros(1,6),zeros(1,6))
xlabel("Bylgju toppa númer [n]")
ylabel('sin \theta')

b =
    63.7532811461383e-003
berr =
    2.27759589879529e-003
droughhar =
    66.9138846569595e-006
droughharerr =
    2.39050895149706e-006
```



tilraun 4 útreikningar

```
tilraun4err = tilraun4.*0.05;
degMarkererr = 5*ones(1, length(degMarker));

figure
errorbar(degMarker, tilraun4, tilraun4err,tilraun4err,
 degMarkererr,degMarkererr); hold on;
plot(0:180,max(tilraun4)*cos(pi/180.*((0:180)+40)).^2); hold off;
xlabel("Skautunar hliðrun [Gráður]")
ylabel("Styrkur [Amper]")
axis([-6 186 0 1.8e-4])
```



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