Numerical Analysis HW#1

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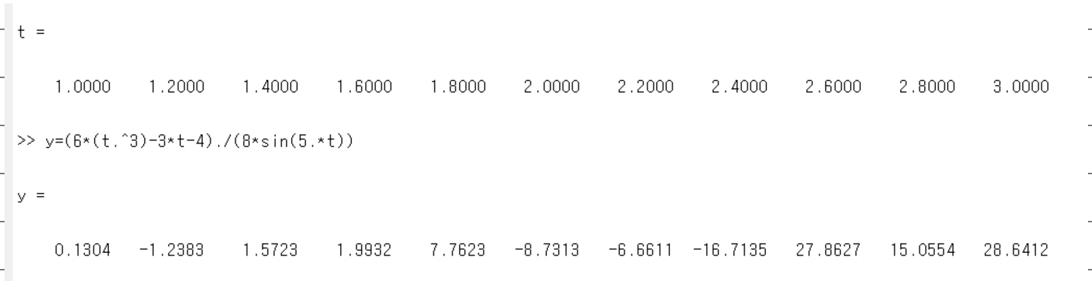
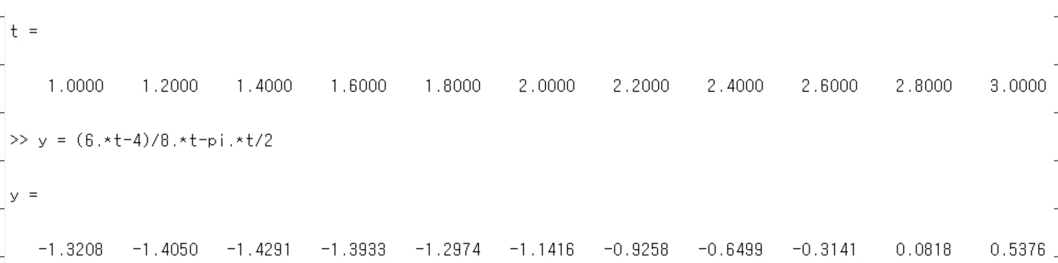
Prob 2.2

(a)



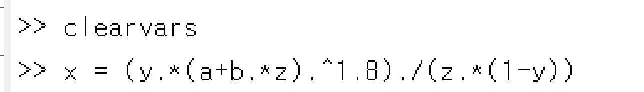
```
t =

    1.0000    1.2000    1.4000    1.6000    1.8000    2.0000    2.2000    2.4000    2.6000    2.8000    3.0000

>> y=(6*(t.^3)-3*t-4)./(8*sin(5.*t))

y =

    0.1304   -1.2383    1.5723    1.9932    7.7623   -8.7313   -6.6611  -16.7135   27.8627   15.0554   28.6412
```

(b)



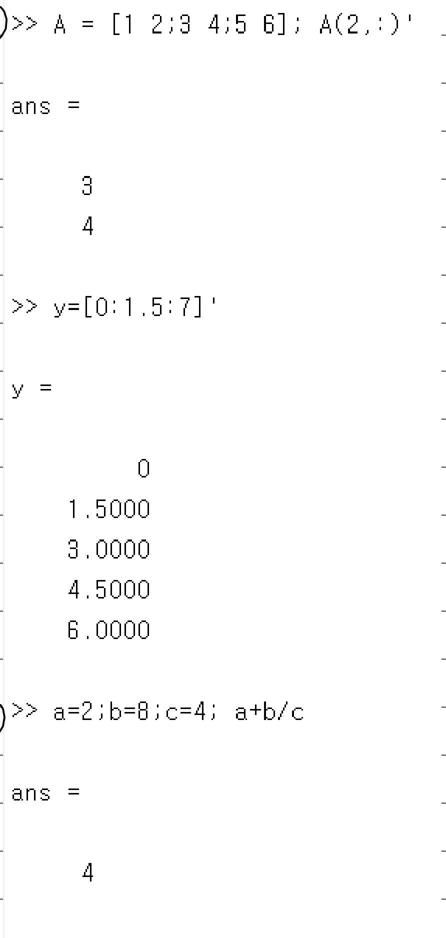
```
t =

    1.0000    1.2000    1.4000    1.6000    1.8000    2.0000    2.2000    2.4000    2.6000    2.8000    3.0000

>> y = (6.*t-4)/8.*t-pi.*t/2

y =

   -1.3208   -1.4050   -1.4291   -1.3933   -1.2974   -1.1416   -0.9258   -0.6499   -0.3141    0.0818    0.5376
```

Prob2.3



```
>> clearvars
>> x = (y.*(a+b.*z).^1.8)./(z.*(1-y))
```

Prob 2.4

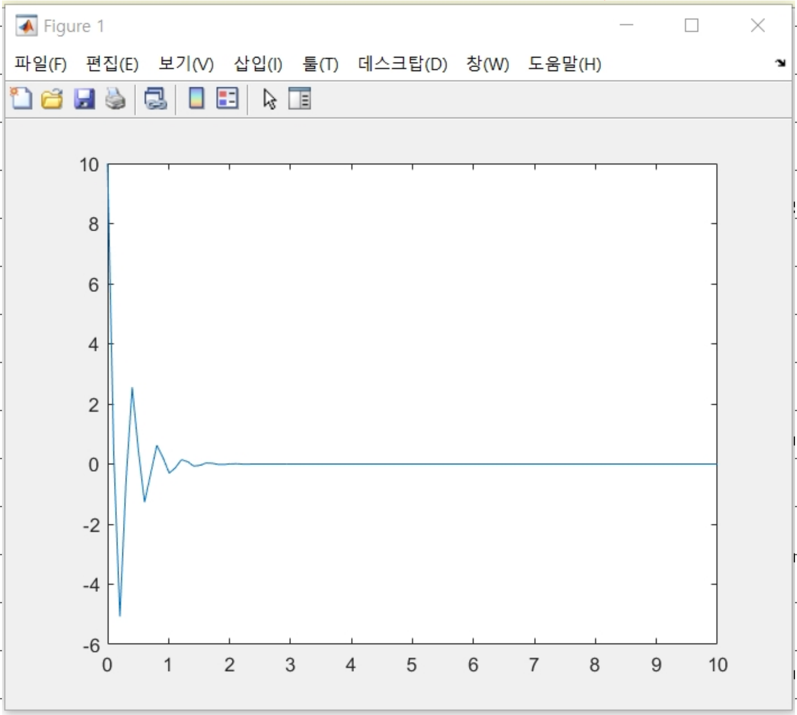


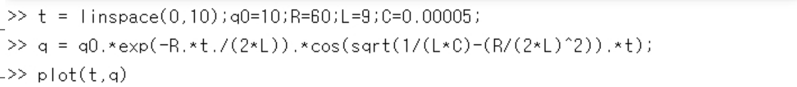
(a)
```
>> A = [1 2;3 4;5 6]; A(2,:)'

ans =

     3
     4
```

(b)
```
>> y=[0:1.5:7]'

y =

         0
    1.5000
    3.0000
    4.5000
    6.0000
```

(c)
```
>> a=2;b=8;c=4; a+b/c

ans =

     4
```

Prob 2.11





```
>> t = linspace(0,10);q0=10;R=60;L=9;C=0.00005;
>> q = q0.*exp(-R.*t./(2*L)).*cos(sqrt(1/(L*C)-(R/(2*L)^2)).*t);
>> plot(t,q)
```

prob2_12

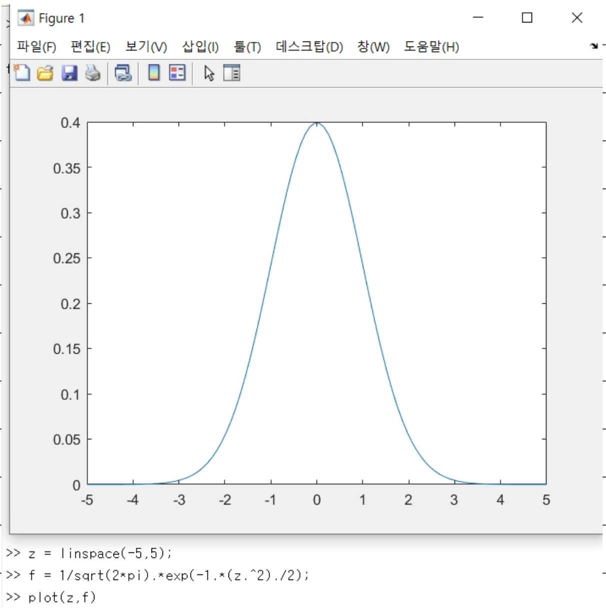
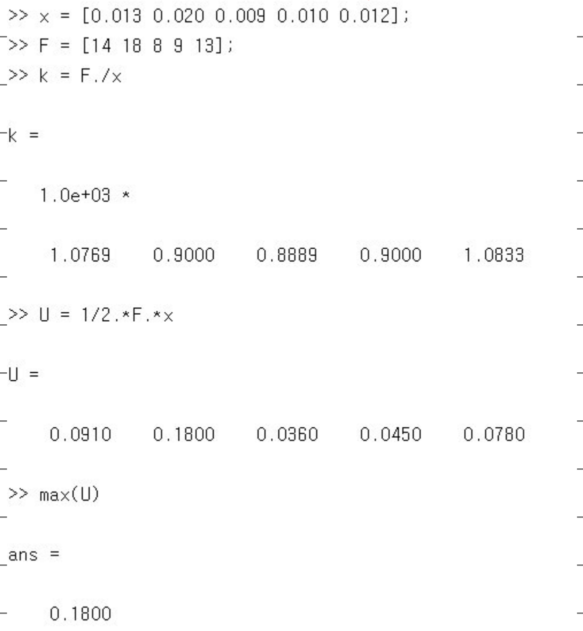


Figure 1
파일(F) 편집(E) 보기(V) 삽입(I) 툴(T) 데스크탑(D) 창(W) 도움말(H)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-5
-4
-3
-2
-1
0
1
2
3
4
5

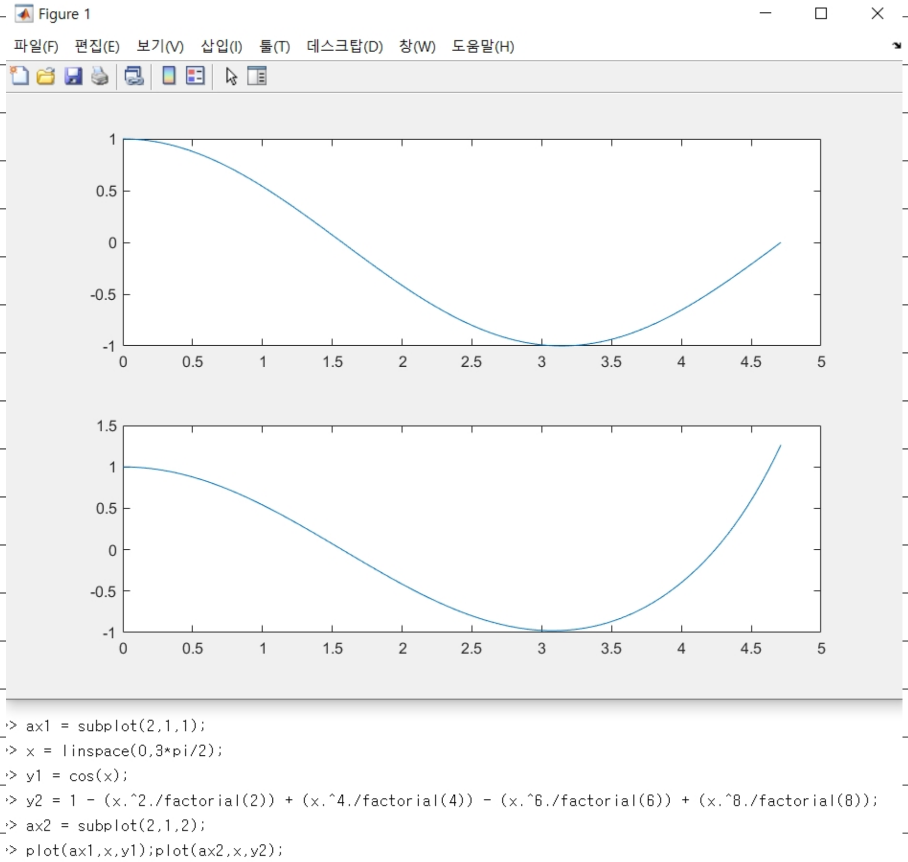
```
>> z = linspace(-5,5);
>> f = 1/sqrt(2*pi).*exp(-1.*(z.^2)./2);
>> plot(z,f)
```

#prob2_13



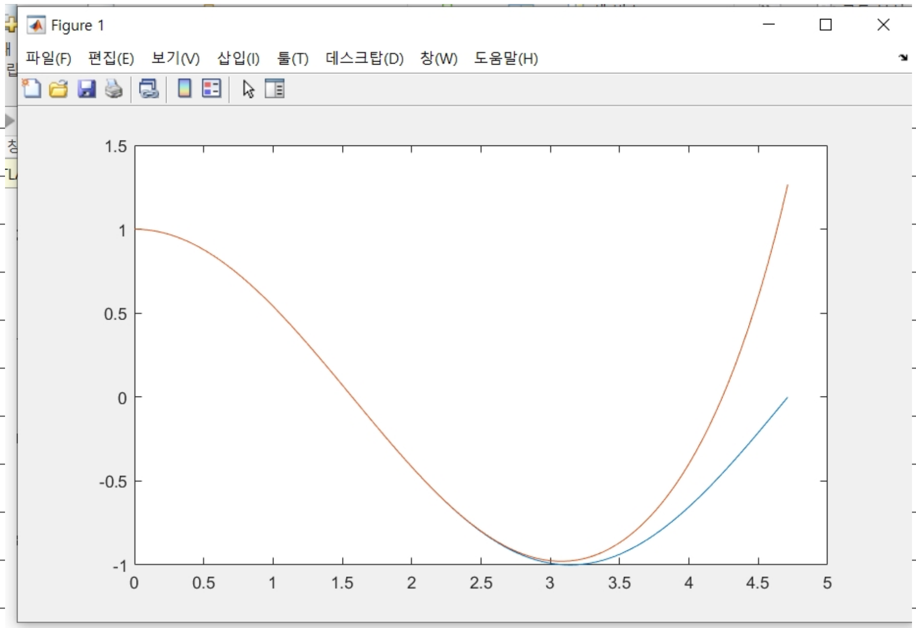
```
>> x = [0.013 0.020 0.009 0.010 0.012];
>> F = [14 18 8 9 13];
>> k = F./x

k =

   1.0e+03 *

    1.0769    0.9000    0.8889    0.9000    1.0833

>> U = 1/2.*F.*x

U =

    0.0910    0.1800    0.0360    0.0450    0.0780

>> max(U)

ans =

    0.1800
```

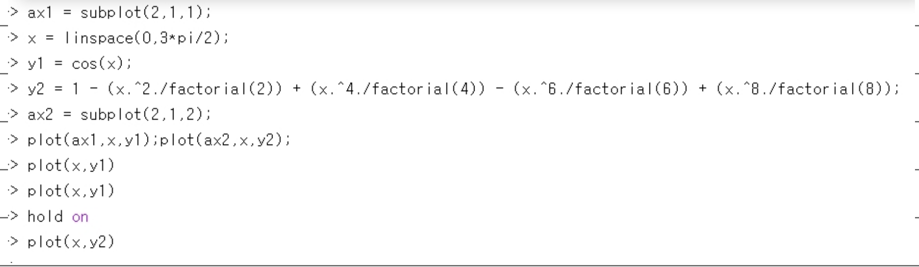
prob2_20



```
>> ax1 = subplot(2,1,1);
>> x = linspace(0,3*pi/2);
>> y1 = cos(x);
>> y2 = 1 - (x.^2./factorial(2)) + (x.^4./factorial(4)) - (x.^6./factorial(6)) + (x.^8./factorial(8));
>> ax2 = subplot(2,1,2);
>> plot(ax1,x,y1);plot(ax2,x,y2);
```

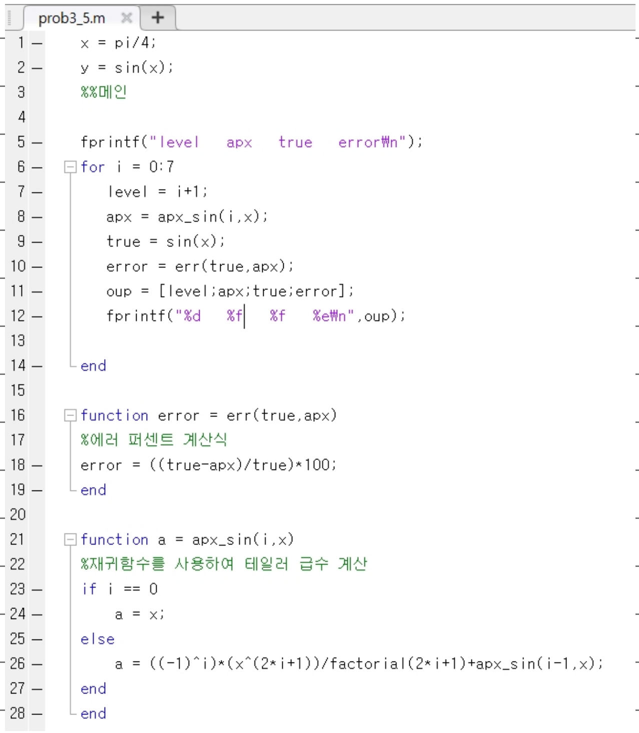
hold on, off 사용





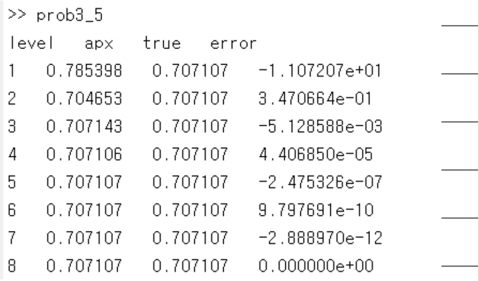
```
> ax1 = subplot(2,1,1);
> x = linspace(0,3*pi/2);
> y1 = cos(x);
> y2 = 1 - (x.^2./factorial(2)) + (x.^4./factorial(4)) - (x.^6./factorial(6)) + (x.^8./factorial(8));
> ax2 = subplot(2,1,2);
> plot(ax1,x,y1);plot(ax2,x,y2);
> plot(x,y1)
> plot(x,y1)
> hold on
> plot(x,y2)
```

prob 3_5 Code:



```
x = pi/4;
y = sin(x);
%%메인

fprintf("level   apx   true   error₩n");
for i = 0:7
    level = i+1;
    apx = apx_sin(i,x);
    true = sin(x);
    error = err(true,apx);
    oup = [level;apx;true;error];
    fprintf("%d   %f   %f   %e₩n",oup);

end

function error = err(true,apx)
%에러 퍼센트 계산식
error = ((true-apx)/true)*100;
end

function a = apx_sin(i,x)
%재귀함수를 사용하여 테일러 급수 계산
if i == 0
     a = x;
else
     a = ((-1)^i)*(x^(2*i+1))/factorial(2*i+1)+apx_sin(i-1,x);
end
end
```

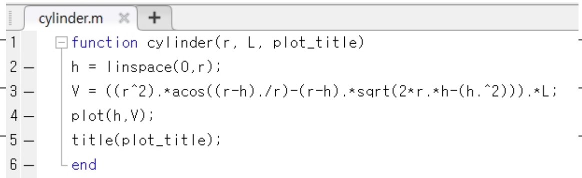
result:



```
>> prob3_5
level   apx    true    error
1    0.785398    0.707107    -1.107207e+01
2    0.704653    0.707107    3.470664e-01
3    0.707143    0.707107    -5.128588e-03
4    0.707106    0.707107    4.406850e-05
5    0.707107    0.707107    -2.475326e-07
6    0.707107    0.707107    9.797691e-10
7    0.707107    0.707107    -2.888970e-12
8    0.707107    0.707107    0.000000e+00
```

Prob3_11

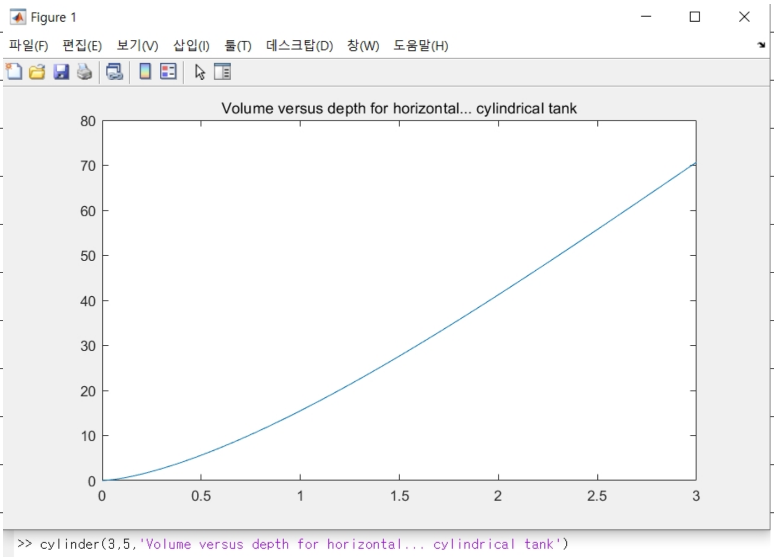
Code:



cylinder.m

```
function cylinder(r, L, plot_title)
h = linspace(0,r);
V = ((r^2).*acos((r-h)./r)-(r-h).*sqrt(2*r.*h-(h.^2))).*L;
plot(h,V);
title(plot_title);
end
```

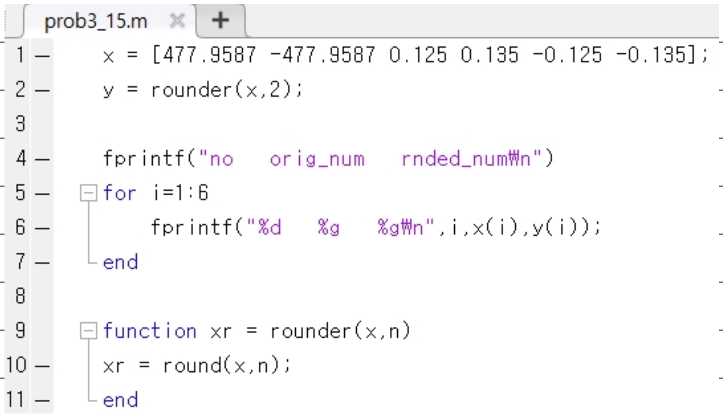
result:



```
>> cylinder(3,5,'Volume versus depth for horizontal... cylindrical tank')
```

Prob3_15

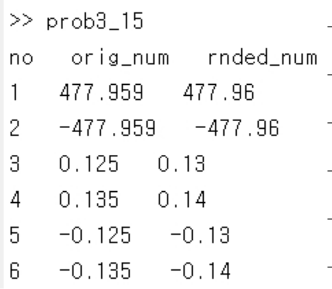
Code:



prob3_15.m

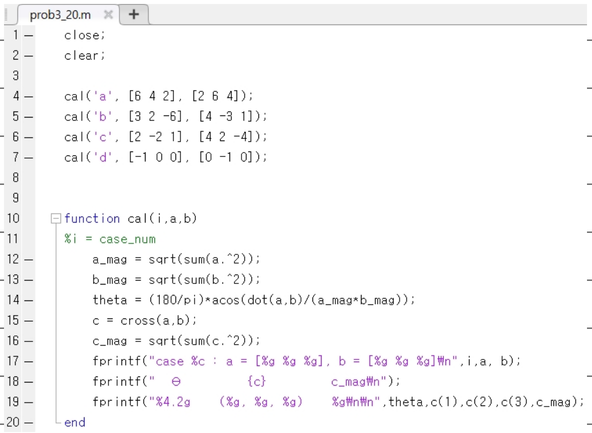
```
    x = [477.9587 -477.9587 0.125 0.135 -0.125 -0.135];
    y = rounder(x,2);

    fprintf("no   orig_num   rnded_num\n")
    for i=1:6
        fprintf("%d   %g   %g\n",i,x(i),y(i));
    end

    function xr = rounder(x,n)
    xr = round(x,n);
    end
```

result:



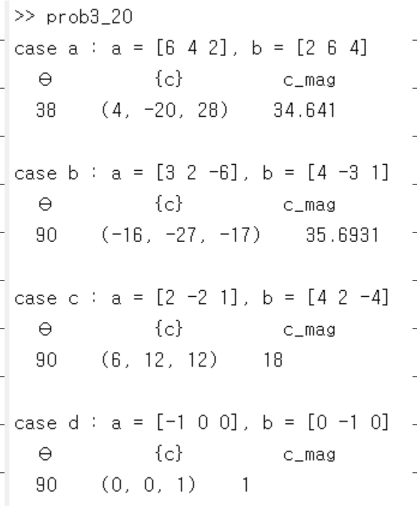
```
>> prob3_15
no   orig_num   rnded_num
1   477.959   477.96
2   -477.959   -477.96
3   0.125   0.13
4   0.135   0.14
5   -0.125   -0.13
6   -0.135   -0.14
```

prob3_20 Code:



```
prob3_20.m

close;
clear;

cal('a', [6 4 2], [2 6 4]);
cal('b', [3 2 -6], [4 -3 1]);
cal('c', [2 -2 1], [4 2 -4]);
cal('d', [-1 0 0], [0 -1 0]);


function cal(i,a,b)
%i = case_num
    a_mag = sqrt(sum(a.^2));
    b_mag = sqrt(sum(b.^2));
    theta = (180/pi)*acos(dot(a,b)/(a_mag*b_mag));
    c = cross(a,b);
    c_mag = sqrt(sum(c.^2));
    fprintf("case %c : a = [%g %g %g], b = [%g %g %g]₩n",i,a, b);
    fprintf("  ϴ         {c}         c_mag₩n");
    fprintf("%4.2g    (%g, %g, %g)    %g₩n₩n",theta,c(1),c(2),c(3),c_mag);
end
```

result:



```
>> prob3_20
case a : a = [6 4 2], b = [2 6 4]
  ϴ         {c}         c_mag
  38    (4, -20, 28)    34.641

case b : a = [3 2 -6], b = [4 -3 1]
  ϴ         {c}         c_mag
  90    (-16, -27, -17)    35.6931

case c : a = [2 -2 1], b = [4 2 -4]
  ϴ         {c}         c_mag
  90    (6, 12, 12)    18

case d : a = [-1 0 0], b = [0 -1 0]
  ϴ         {c}         c_mag
  90    (0, 0, 1)    1
```