Comp Lab 2

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1 Stage 1

1.1 Step 1

```
a = pi/6; % alpha = 30 dg (convert to rad)
g = 9.81; % gravatational constant

v_th = 0.5; % constant speed of theta
% const speed = no acc

a_p = g*cos(a)*sin(a); % calculate acc of p

a_z = g; % acc along z

T = 15;
tsteps = 0.1;

mat=zeros(T/tsteps+1,5);
```

1.2 Step 2

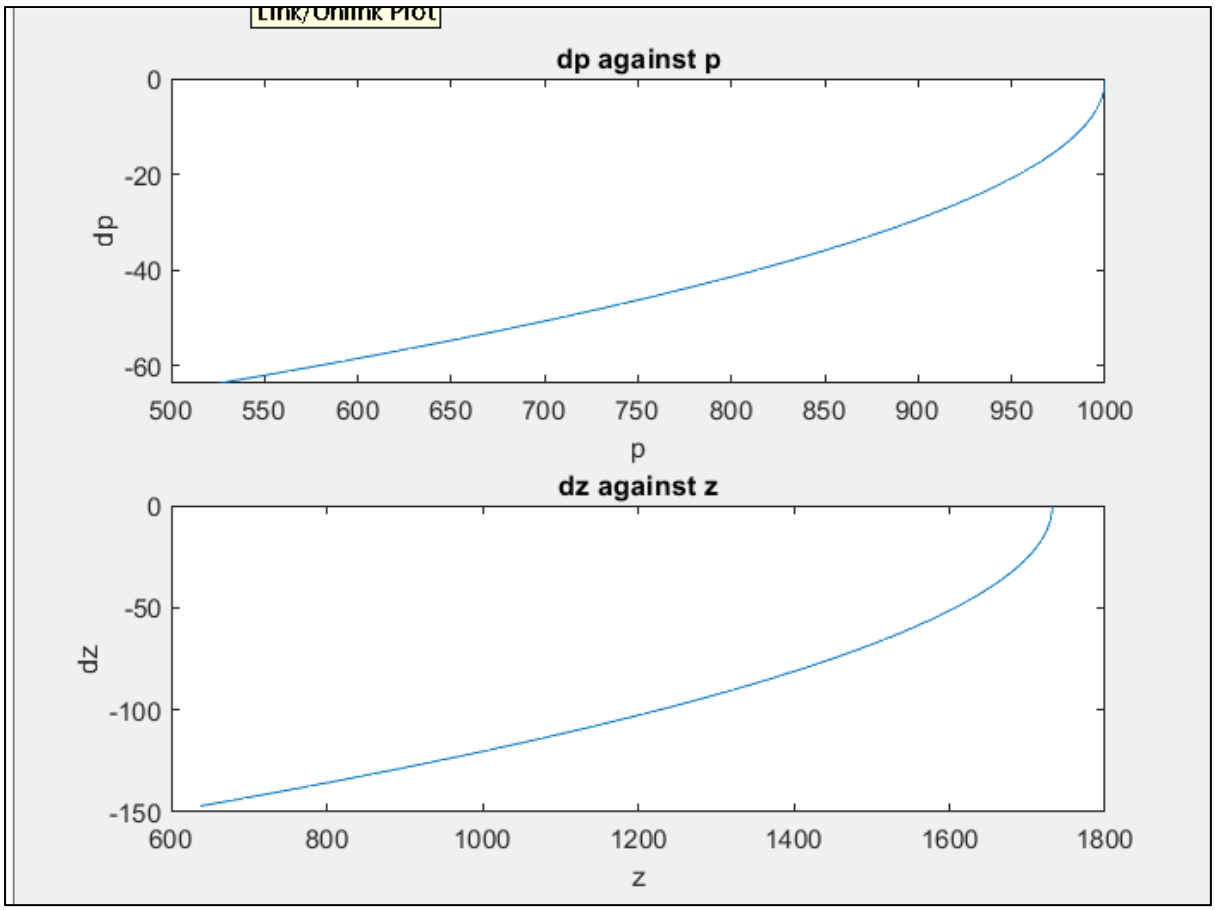
```
%initialise
mat(1,2) = 1000; % p_0 =1000
mat(1,3) = 1000 /(tan(a));
```

1.3 Step 3

```
for loop = 1:(T/tsteps)

    % find for theta
    mat(loop+1,1) = rem((mat(loop,1) + v_th*tsteps),(2*pi));

    % find for z

    mat(loop+1,5)= mat(loop,5) - a_z*tsteps;
    mat(loop+1,3)= mat(loop,3) + mat(loop,5)*tsteps;

    % find for p
    mat(loop+1,4)= mat(loop,4) -a_p*tsteps;
    mat(loop+1,2)= mat(loop,2) +mat(loop,4)*tsteps;
end
```

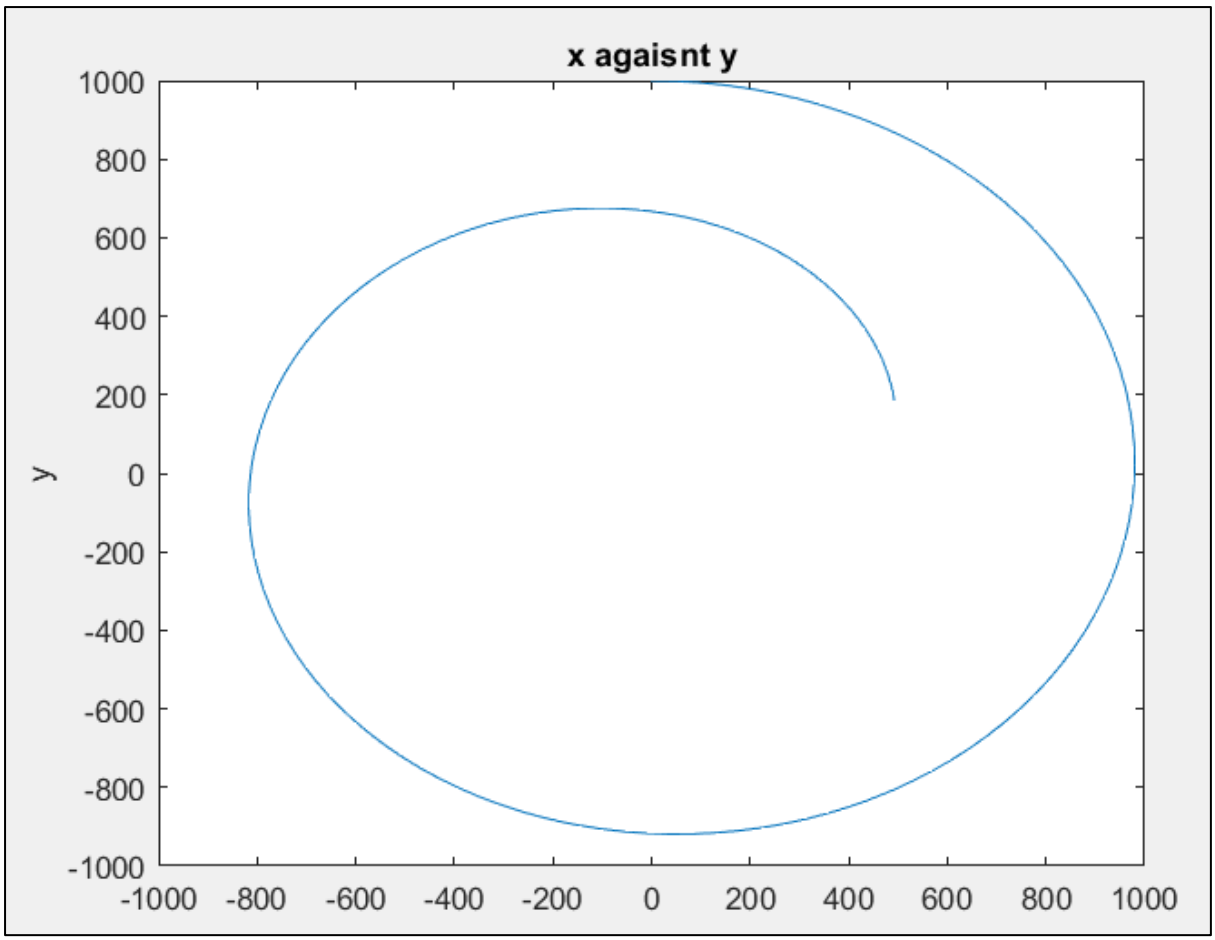
1.4 Step 4

```
figure(1)
subplot(2,1,1);
plot(mat(:,2),mat(:,4))
xlabel("p")
ylabel("dp")
title("dp against p")

subplot(2,1,2);
plot(mat(:,3),mat(:,5))
title("dz against z")
xlabel("z")
ylabel("dz")
```



1.5 Step 5

```
figure(2)
x = mat(:,2).*sin(mat(:,1));
y = mat(:,2).*cos(mat(:,1));
plot(x,y)
title("x agaisnt y")
xlabel("x")
ylabel("y")
```



2 Stage 2

2.1 Step 1

```
a = pi/6; % alpha = 30 dg (convert to rad)
g = 9.81; % gravatational constant

z = 1000/tan(a);
t = sqrt(2*z/g)
```

```
t =

   18.7915
```

2.2 Step 2

```
b = pi/3;

z2 = 1000/tan(b);
t2 = sqrt(2*z2/g)
```

```
t2 =

   10.8493
```

2.3 Step 3