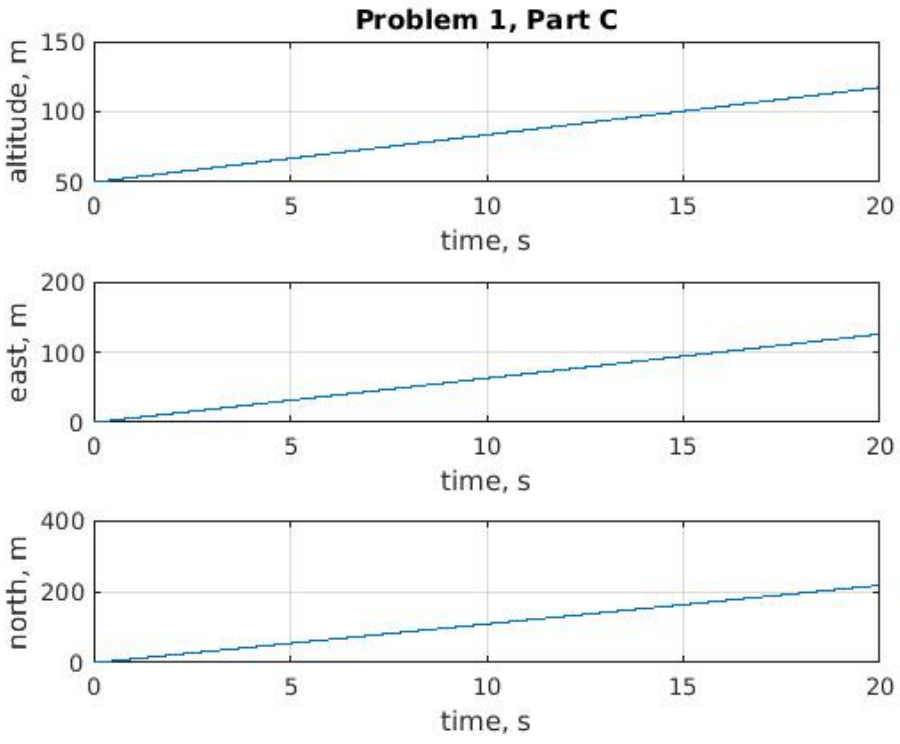
1.)

a.)

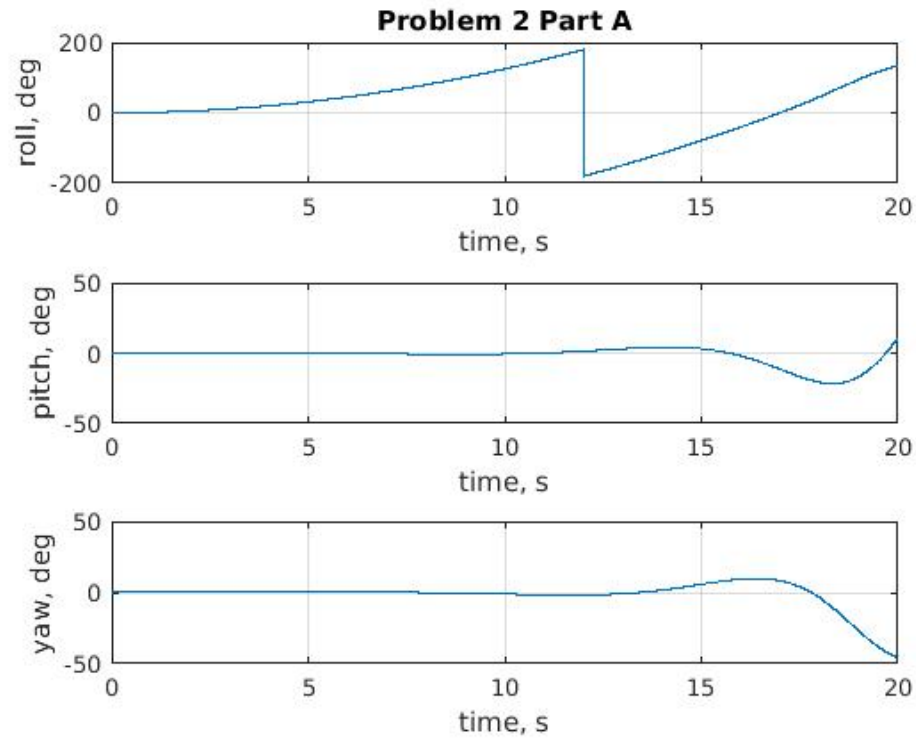
```
% Your code goes below...

% Compute DCMs
R_ned2b = eulerToRotationMatrix(phi,theta,psi);

% NED Position EoMs
Pdot_ned = (R_ned2b')*vg_b;

% Body groundspeed vector EoMs
vgdot_b = cross(-w_b, vg_b) + (f_b/P.mass);

% Euler angle EoMs
M = [1, sin(phi)*tan(theta), cos(phi)*tan(theta);
    0, cos(phi), -sin(phi);
    0, sin(phi)*sec(theta),cos(phi)*sec(theta)];
euler_rates = M*w_b;

% Body rate EoMs
J = [P.Jx, 0,-P.Jxz;
    0, P.Jy, 0;
    -P.Jxz, 0, P.Jz];
wdot_b = inv(J)* (cross(-w_b, (J*w_b))+m_b) ;

% Compile state derivatives vector
xdot = [Pdot_ned; vgdot_b; euler_rates; wdot_b];

% Compile function ouput
out = xdot;
```

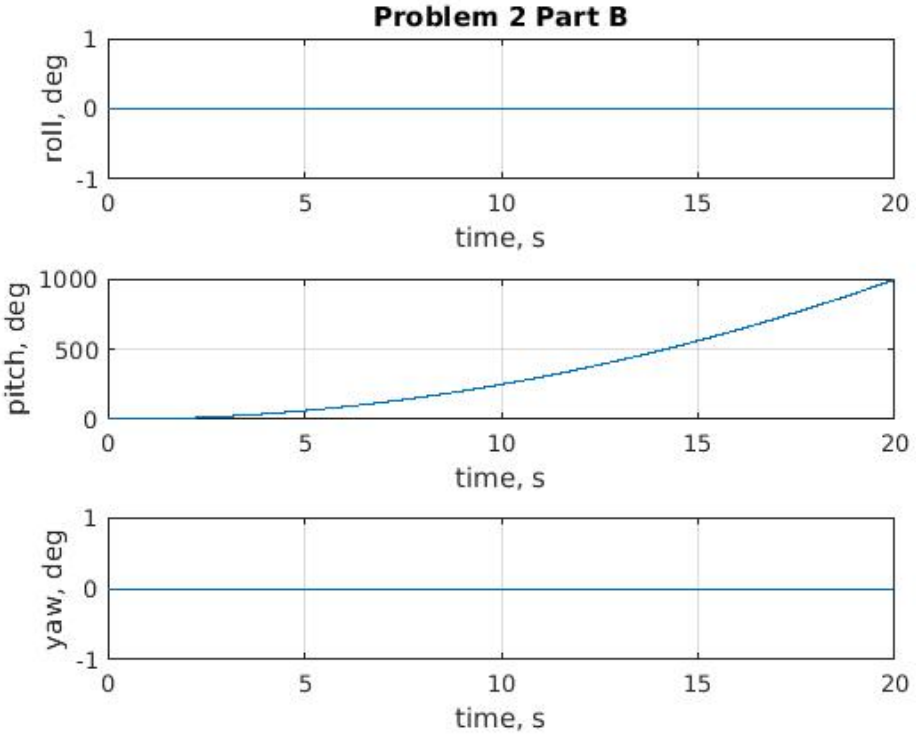
b.) Plane flies straight and level, maintaining its altitude

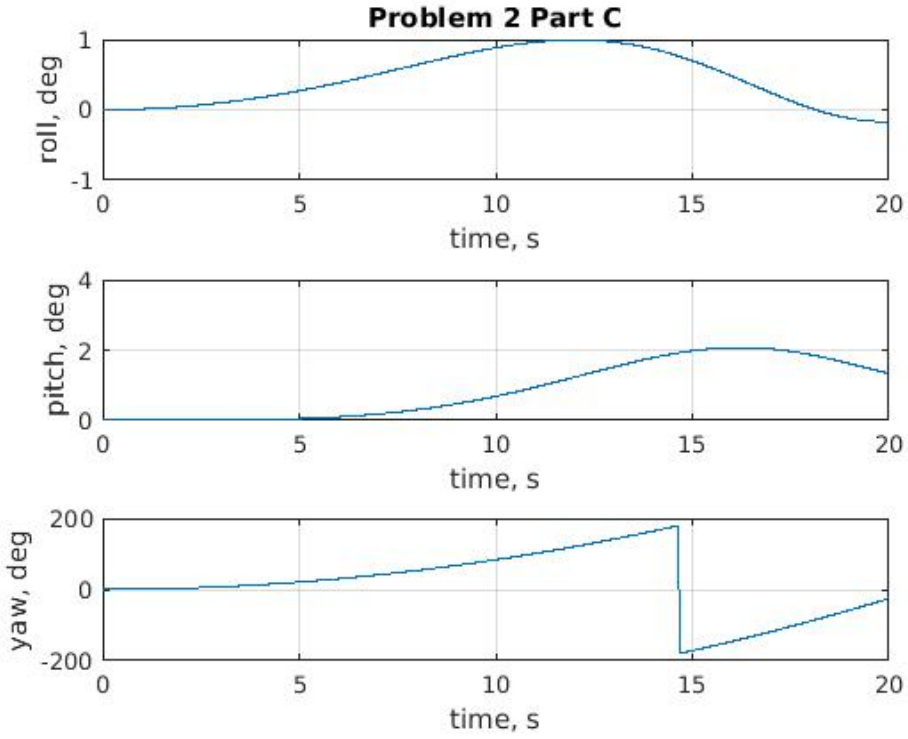
c.)



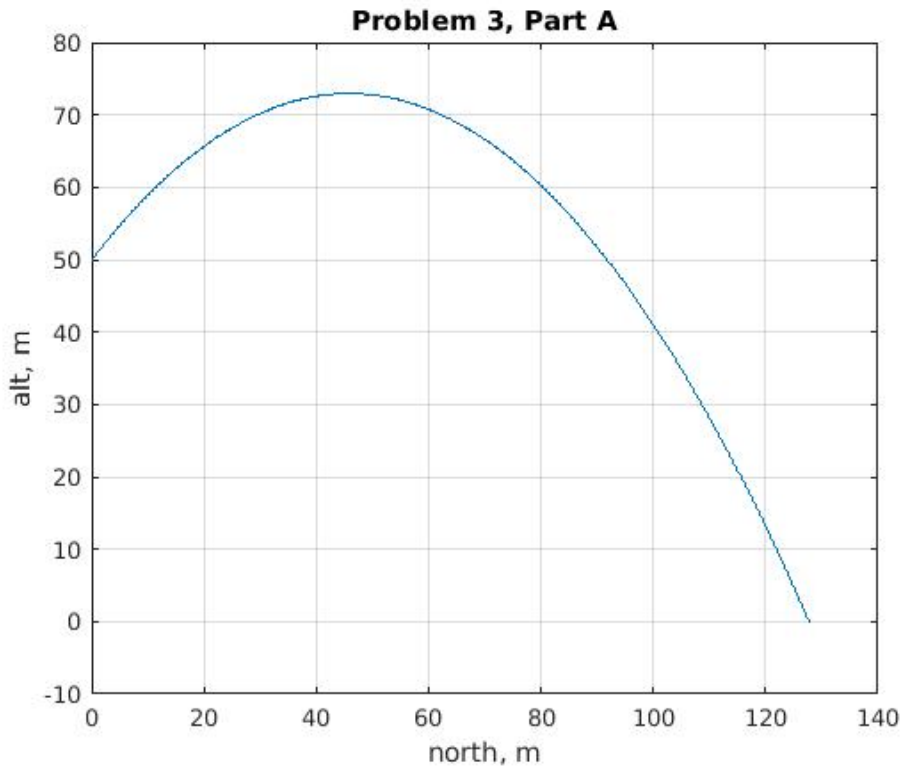
2.)


Problem 2 Part A
roll, deg
200
0
-200
0
5
10
15
20
time, s
pitch, deg
50
0
-50
0
5
10
15
20
time, s
yaw, deg
50
0
-50
0
5
10
15
20
time, s


Problem 2 Part B
roll, deg
1
0
-1
0
5
10
15
20
time, s
pitch, deg
1000
500
0
0
5
10
15
20
time, s
yaw, deg
1
0
-1
0
5
10
15
20
time, s


Problem 2 Part C
roll, deg
1
0
-1
0
5
10
15
20
time, s
pitch, deg
4
2
0
0
5
10
15
20
time, s
yaw, deg
200
0
-200
0
5
10
15
20
time, s

3.)



b.) max altitude = 72.9436 meters
c.) north pos at ground impact = 127.7035 meters
d.) min ground speed = 21.2132 meters/sec
max ground speed = 43.4511 meters/sec

4.)

6.)