```
1 clear all
 2 close all
 3 clc
 5 time final = 20; %Final time
 7 %%%%%% MODIFY. Initial state values and parameter values
8 state = [0;0;0]; % euler angles
 9 omega ab in b = 2 * [1; 1; 1];
10
11 % Simulate dynamics
12 try
     %%%%% MODIFY THE FUNCTION "Kinematics" TO PRODUCE SIMULATIONS OF THE SOLID &
1.3
ORIENTATION
14
     응응응응응
15
      %%%%%% Hints:
      %%%%%% - "parameters" allows you to pass some parameters to the "Kinematic" ∠
function.
17
     %%%%%% - "state" will contain representations of the solid orientation (SO ∠
(3)).
18
     %%%%% - use the "reshape" function to turn a matrix into a vector or vice- ⊌
versa.
19
20
       [time, statetraj] = ode45(@(t,x)Kinematics(t, x, omega ab in b),[0,\checkmark
time final],state);
22 catch message
23
      display('Your simulation failed with the following message:')
24
      display(message.message)
25
      display(' ')
26
27
      %Assign dummy time and states if simulation failed
28
      time = [0, 10];
29
      statetraj = [0,0];
30 end
31
32 %Below is a template for a real-time animation
33 ScaleFrame = 5; % Scaling factor for adjusting the frame size (cosmetic)
            = 15; % Fontsize for text
34 FS
35 SW
             = 0.035; % Arrows size
36
37 time display = 0; % initialise time display
38 while time display < time(end)
39
      state animate = interp1(time, statetraj, time display); %interpolate the \checkmark
simulated state at the current clock time
41
           = [5;5;5]; % Position of the single body
42
43
      %%%%% MODIFY THE FOLLOWING LINES TO PRODUCE AN "omega" AND "R" FROM YOUR ✔
SIMULATION STATE
45
46
      omega = omega ab in b;
47
      R = Rotations(state animate.'); % .' to avoid complex conjugates
48
      49
50
51
    %3D below this point
```

```
52
      figure(1);clf;hold on
53
      MakeFrame( zeros(3,1),eye(3),ScaleFrame,FS,SW,'a', 'color', 'k')
      MakeFrame( p,R,ScaleFrame,FS,SW,'b', 'color', 'r')
54
      MakeArrow( p,R*omega,FS,SW,'$$\omega$$', 'color', [0,0.5,0])
55
56
      DrawRectangle(p,R ,'color',[0.5,0.5,0.5]);
57
      FormatPicture([0;0;2],0.5*[73.8380 21.0967 30.1493])
58
59
     if time display == 0
          display('Hit a key to start animation')
60
61
          pause
62
          tic
63
      end
64
      time display = toc; %get the current clock time
65 end
66
```