```
% Jesse Wynn
% Robotics HW 3

clc
clear

% Problem 7-4 from the book

% experiment with ikine and ikine6s with the p560 robot

mdl_puma560

bot = p560;

% different joint angles

q1 = [0, 0.7854, 3.141, 0, 0.7854, 0];
q2 = [0, 0.8, 3, 0, 0.8, 0];
q3 = [0, 0.75, 3.2, 0, 0.75, 0];

q = [q1; q2; q3];

for i = 1:3
    joint_angles = q(i,:);

    % get the transformation using forward kinematics
    T = bot.fkine(joint_angles);

    % now compare ikine6s and ikine (analytical and numerical)
    tstart_1 = tic;

    % solve using ikine6s
    ik6s_joint_angles = bot.ikine6s(T);

    telapsed_1 = toc(tstart_1);

    % now do the same with ikine
    tstart_2 = tic;

    % solve using ikine
    ik_joint_angles = bot.ikine(T);

    telapsed_2 = toc(tstart_2);

    if telapsed_2 > telapsed_1
        disp 'ikine faster than ikine6s by:'
        diff = (telapsed_2 - telapsed_1);
        disp(diff)
        disp 'seconds'
    else
        disp 'this will never happen'
    end
```

```
    % see how different the transformations are
    T_ik = bot.fkine(ik_joint_angles);

    T_diff = T_ik - T
end
```

```
ikine faster than ikine6s by:
    0.0562

seconds

T_diff =

   1.0e-10 *

    0.0240   -0.0433    0.0000    0.2177
   -0.0154         0    0.0433   -0.1503
   -0.0000   -0.0154    0.0240   -0.0083
         0         0         0         0

ikine faster than ikine6s by:
    0.0537

seconds

T_diff =

   1.0e-10 *

    0.0199   -0.0376    0.0022    0.1710
   -0.0147         0    0.0362   -0.1431
   -0.0022   -0.0106    0.0199   -0.0159
         0         0         0         0

ikine faster than ikine6s by:
    0.0531

seconds

T_diff =

   1.0e-10 *

    0.0253   -0.0429    0.0003    0.2374
   -0.0151         0    0.0427   -0.1484
   -0.0003   -0.0145    0.0253   -0.0099
         0         0         0         0
```

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