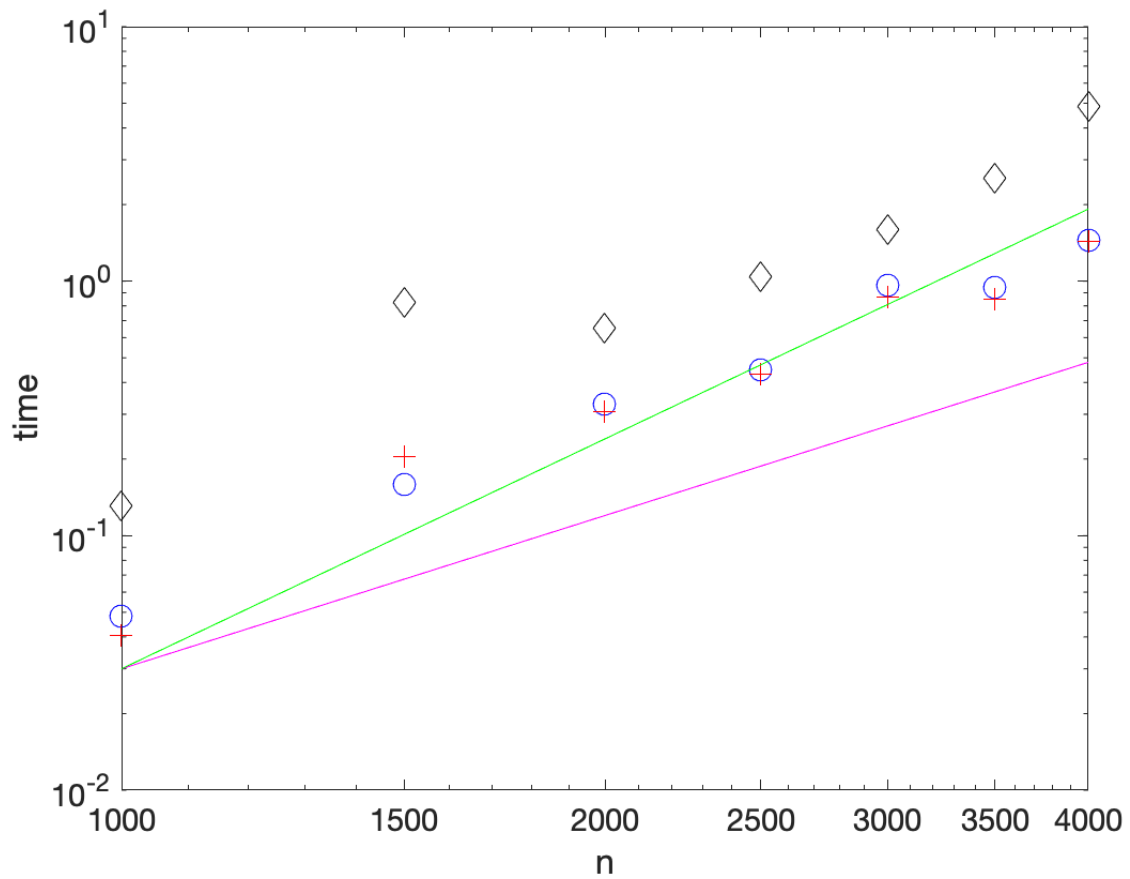


Problem4



The lu method is the fastest method, backslash is the second and the inverse is the lowest method.

Problem5

	Time for 1000 Systems	Time for 10000 Systems
Backslash	0.2151	1.8869
LU	0.0255	0.2376
Inverse	0.3567	3.2293

Problem6

(b)(c)(d)

Code

```
%% Problem4
clear; close all; clc

nvec = 1000:500:4000;

for n = nvec
    A = rand(n);
    b = rand(n,1);

    tic
    x = A\b;
    bstime = toc;
    loglog(n,bstime, 'ob', 'markersize', 10)
    hold on

    tic
    [L,U,P] = lu(A);
    y = L\(P*b);
    x = U\y;
    lutime = toc;
    loglog(n,lutime, 'r+', 'markersize', 10)
    hold on

    tic
    x = inv(A)*b;
    intime = toc;
    loglog(n,intime, 'kd', 'markersize', 10)
    hold on
end
xlabel('n')
ylabel('time')
set(gca, 'fontsize', 14)
loglog(nvec, 3e-8*nvec.^2, 'm')
loglog(nvec, 3e-11*nvec.^3, 'g')
print('HW3_fig1.png', '-dpng')
```

```

%% Problem5

clear; close all; clc
A = toeplitz(1:100);
b = rand(100,1);
[L,U,P] = lu(A);
tic
for k = 1:1000
    x = A\b;
end
backslashtime1 = toc;
tic
for k = 1:10000
    x = A\b;
end
backslashtime2 = toc;
tic
for k = 1:1000
    y = L\(P*b);
    x = U\y;
end
ltime1 = toc;
tic
for k = 1:10000
    y = L\(P*b);
    x = U\y;
end
ltime2 = toc;
tic
for k = 1:1000
    x = inv(A)*b;
end
intime1 = toc;
tic
for k = 1:10000
    x = inv(A)*b;
end
intime2 = toc;
backslashtime1
ltime1
intime1
backslashtime2
ltime2
intime2

```