Evaluating a 2 variable function

$$z = -x^2 + y^2 + 2xy$$

Define the range of values for x and y:

```
x = -12:1:12;
y = -10:1:10;
```

z will be an array of dimensions (ny, nx), where ny=length(y) and nx=length (x). You will need a nested loop to evaluate z:

```
for i=1:nx
    for j=1:ny
        z(j,i) = -x(i)^2 + y(j)^2 + 2*x(i)*y(j);
    end
end
```

Plotting a 2 variable function

Once you have evaluate z, you have several options to evaluate it (look in the Matlab help for more fancy options):

```
figure; mesh(x,y,z); grid on;
xlabel('X'); ylabel('Y');zlabel('Z');

figure; surf(x,y,z); grid on;
xlabel('X'); ylabel('Y');zlabel('Z');

figure; surfl(x,y,z); grid on;
xlabel('X'); ylabel('Y');zlabel('Z')
shading interp;colormap(copper);
```

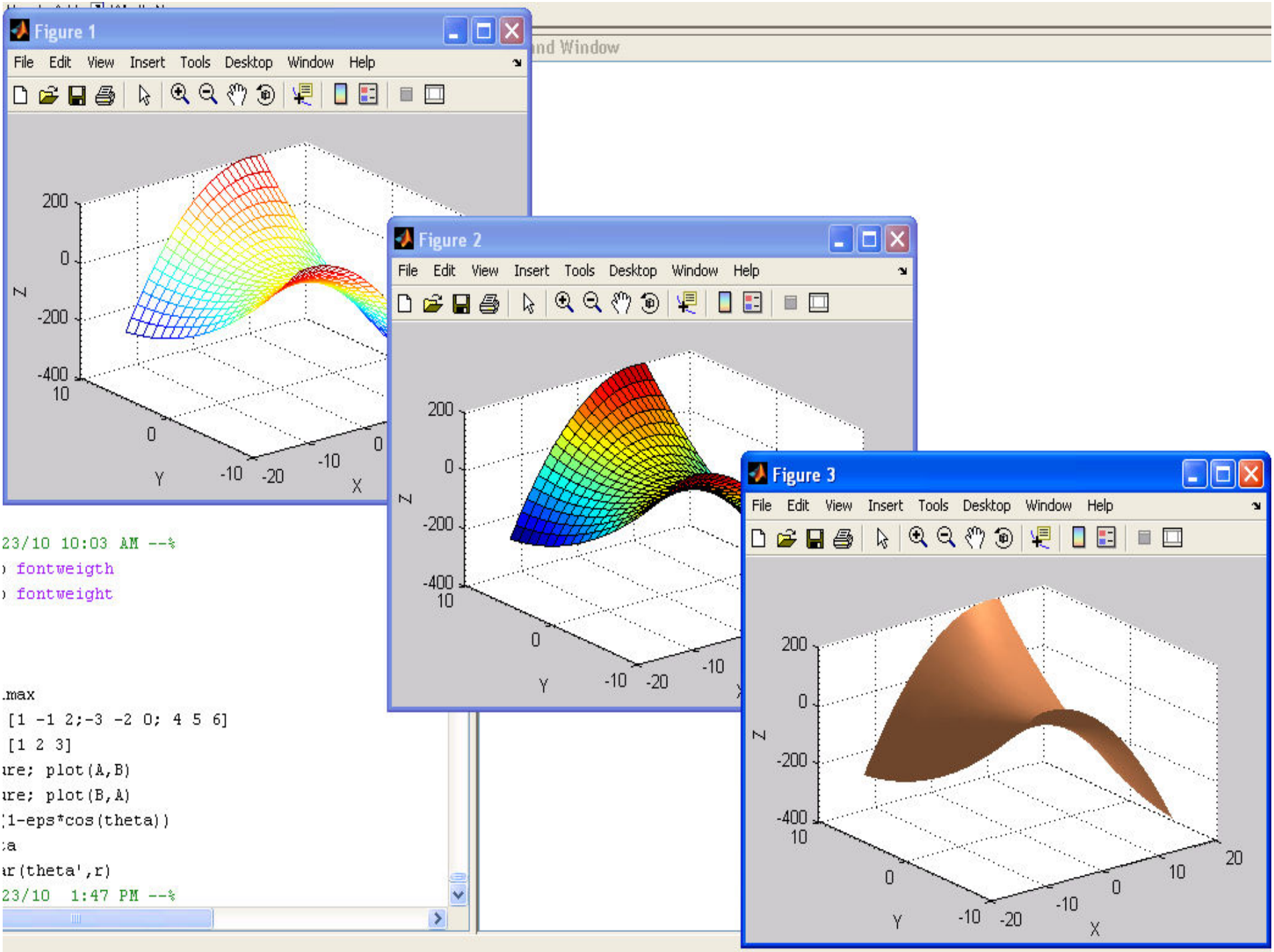


Figure 1
File Edit View Insert Tools Desktop Window Help
200
0
-200
-400
Z
10
0
Y
-10
-20
-10
0
X
Figure 2
File Edit View Insert Tools Desktop Window Help
200
0
-200
-400
Z
10
0
Y
-10
-20
-10
Figure 3
File Edit View Insert Tools Desktop Window Help
200
0
-200
-400
Z
10
0
Y
-10
-20
-10
0
10
20
X
23/10 10:03 AM --%
fontweigth
fontweight
.max
[1 -1 2;-3 -2 0; 4 5 6]
[1 2 3]
ure; plot(A,B)
ure; plot(B,A)
1-eps*cos(theta))
:a
ar(theta',r)
23/10 1:47 PM --%

The max, min and abs commands

```
A = [-3 2 1 4];
B = [4 5 6; -1 6 7; 2 0 9];
C = [ 8 3 5; -3 5 6; 3 1 0];

max(A)       = 4
max(B)       = [4 6 9]
max(B,[],1) = [4 6 9]
max(B,[],2) = [6;7;9]
min(B,C)     = [4 3 5;-3 5 6;2 0 0]
[D,I] = min(B)
          D = [-1 0 6]
          I =  [2 3 1]
min(abs(A)) = 1
min(abs(C),[],2) =?
abs(4+3i)          = 5
real(4 +3i)         = 4
imag(4 + 3i)      = 3
```

The interp1 command: one dimensional data interpolation

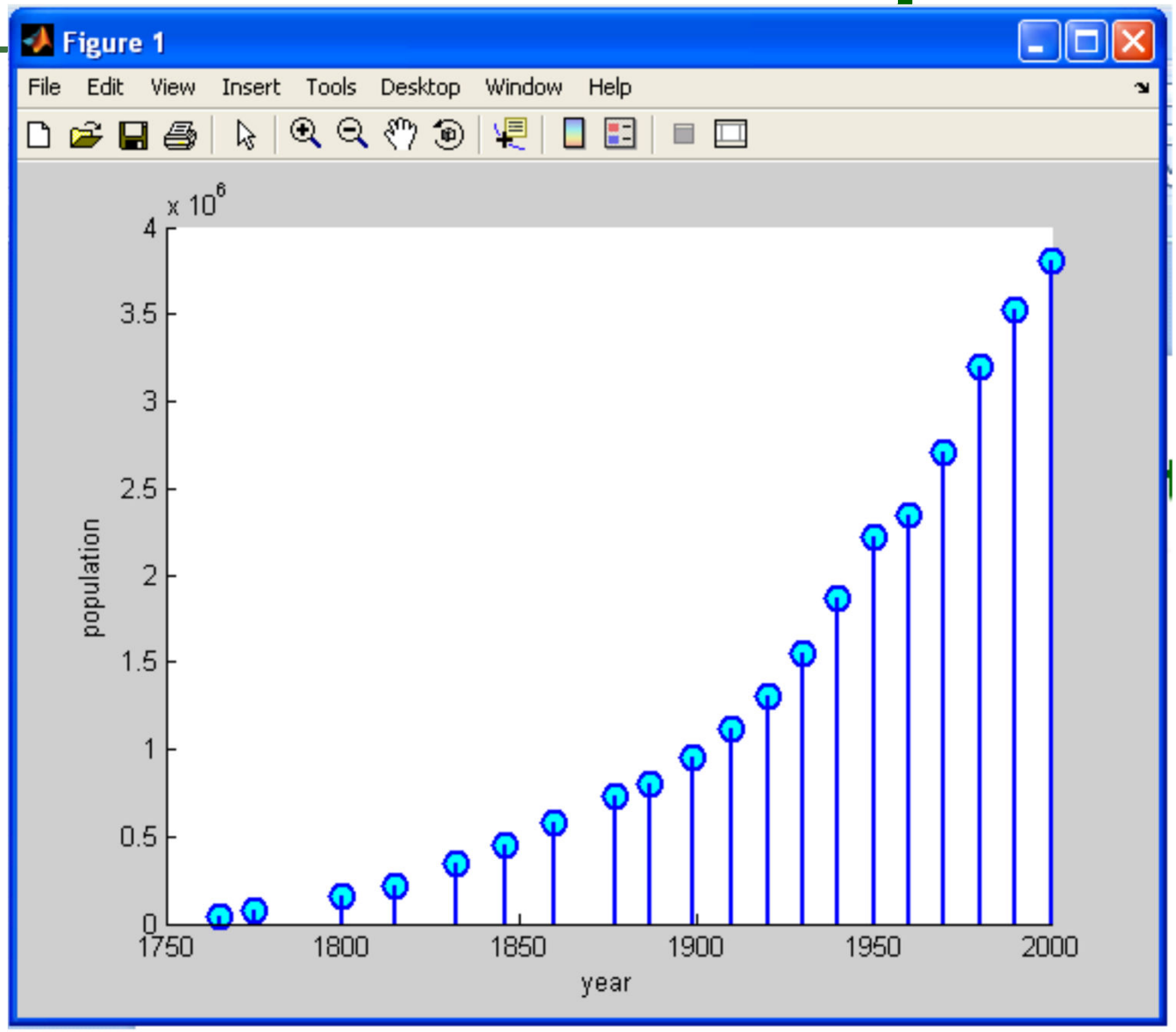
```
year = [1765 1775 1800 1815 1832 1846 1860
1877 1887 1899 1910 1920 1930 1940 1950
1960 1970 1980 1990 2000];

population = [44883 70250 155426 220892
350051 447914 583308 731648 798565 953243
1118012 1299809 1543913 1869255 2210703
2349544 2712033 3196520 3522037 3808610];

figure;
stem(year,population,'ob','LineWidth',2,'MarkerE
dgeColor','b','MarkerFaceColor','c','MarkerSize',1
0);xlabel('year');ylabel('population')
```

year	population
1765	44883
1775	70250
1800	155426
1815	220892
1832	350051
1846	447914
1860	583308
1877	731648
1887	798565
1899	953243
1910	1118012
1920	1299809
1930	1543913
1940	1869255
1950	2210703
1960	2349544
1970	2712033
1980	3196520
1990	3522037
2000	3808610

The interp1 command: one dimensional data interpolation



The interp1 command: one dimensional data interpolation

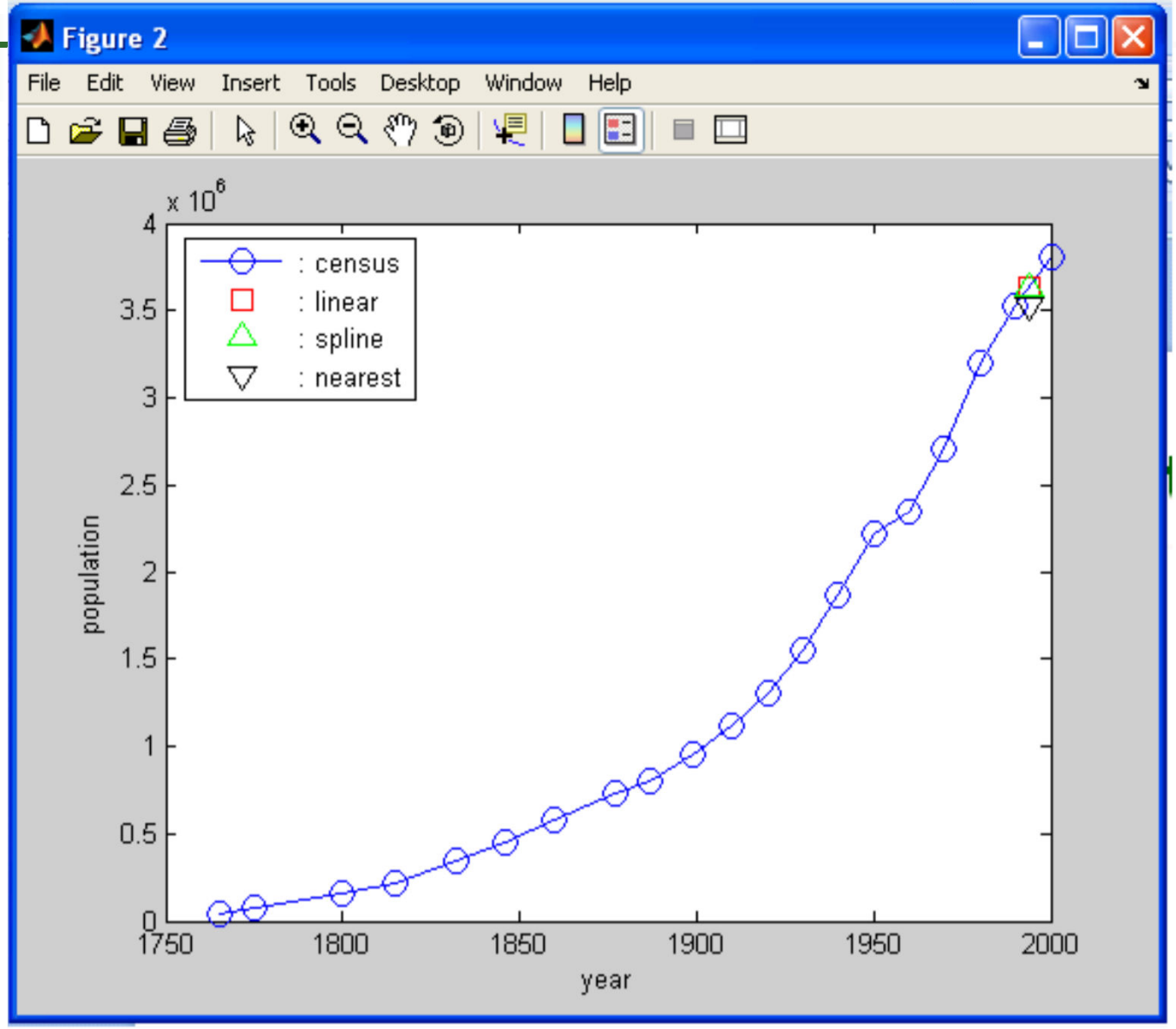
```
% si deseo saber la población en año en especifico:

spyear = 1994;      %año en que deseo saber la población

sppopulation1 = interp1(year,population,spyear,'linear');
sppopulation2 = interp1(year,population,spyear,'spline');
sppopulation3 = interp1(year,population,spyear,'nearest');

figure; plot(year,population,'-ob',spyear,sppopulation1,'sr',...
spyear,sppopulation2,'^g',spyear,sppopulation3,'vk','MarkerSize',1
0);
xlabel('year');ylabel('population');
legend(' : census', ' : linear', ' : spline', ' : nearest')
```

The interp1 command: one dimensional data interpolation



The interp1 command: one dimensional data interpolation

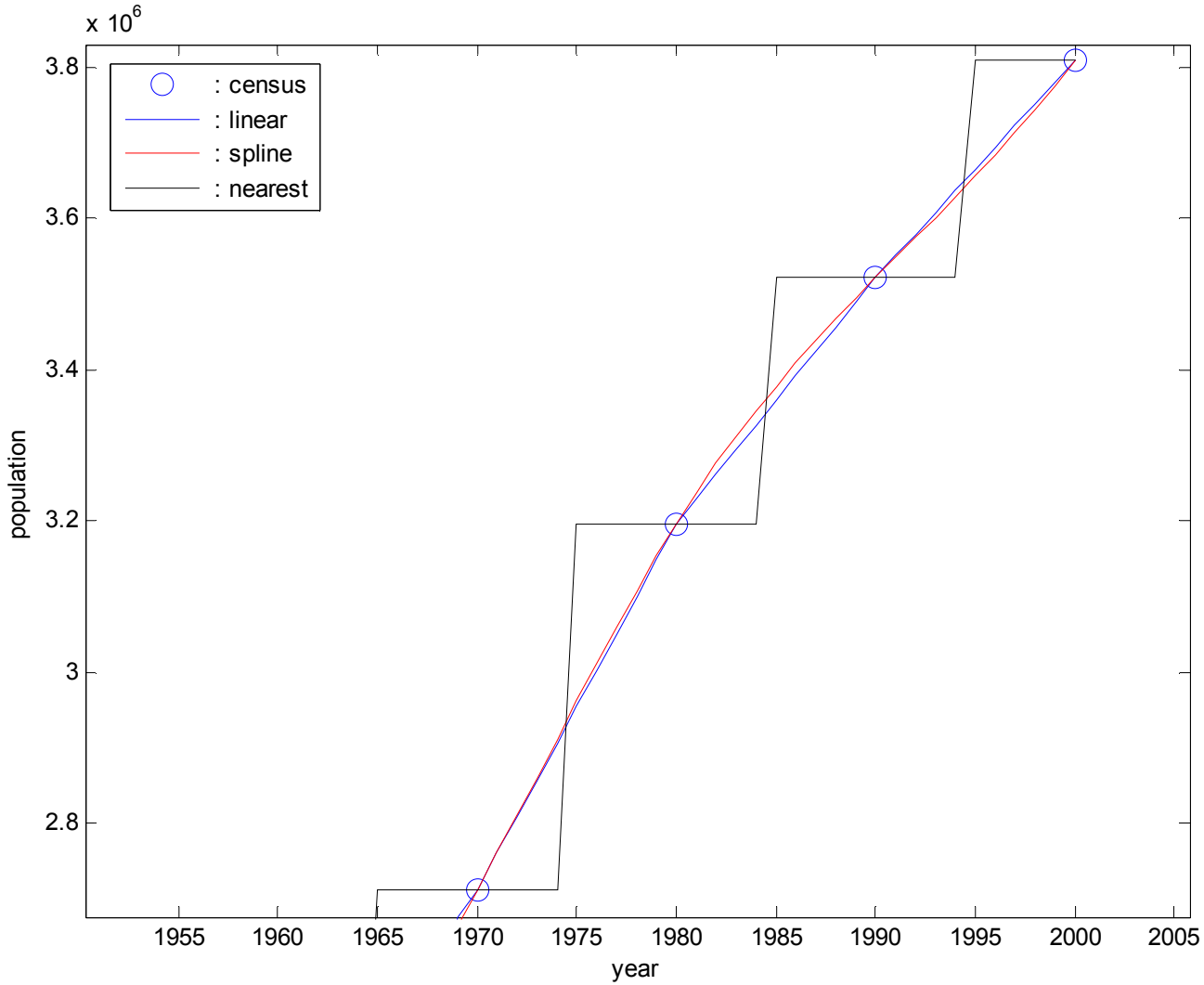
```
% si deseo saber la poblacion cada año

year2 = 1765:1:2000;

eypopulation1 = interp1(year,population,year2,'linear');
eypopulation2 = interp1(year,population,year2,'spline');
eypopulation3 = interp1(year,population,year2,'nearest');

figure; plot(year,population,'ob',year2,eypopulation1,'-b',...
year2,eypopulation2,'-r',year2,eypopulation3,'-k','MarkerSize',10);
xlabel('year');ylabel('population');
legend(' : census', ' : linear', ' : spline', ' : nearest')
```

The interp1 command: one dimensional data interpolation



The interp1 command: one dimensional data interpolation

```
% si deseo un estimado en el futuro:

year3 = 1765:1:2050;

futpopulation1 = interp1(year,population,year3,'linear','extrap');
futpopulation2 = interp1(year,population,year3,'spline','extrap');
futpopulation3 = interp1(year,population,year3,'nearest','extrap');

figure; plot(year,population,'ob',year3,futpopulation1,'-b',...
year3,futpopulation2,'-r',year3,futpopulation3,'-
k','MarkerSize',10);
xlabel('year');ylabel('population');
legend(' : census', ' : linear', ' : spline', ' : nearest');
```

The interp1 command: one dimensional data interpolation