Introduction to Matlab

Advanced Plotting, Control Flow Statements

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Dresden, 08.05.2015

Today's Plan

| Date	Topics	Projects
17.04.	Intro, basic operations, matrices	
24.04.	Data handling, random numbers, basic plotting	1st Project Assignment
01.05.	Holiday (Labour day)	
08.05	Advanced plotting, scripts, control flow 1st Project Presentation	1st Project Deadline 2nd Project Assignment
15.05.	Control flow statements, signal processing,	
22.05.	Functions, integration, image, and sound	
29.05.	Holiday (Pfingstferien)	
05.06.	Data Analysis, statistics, 2nd Project Presentation	2nd Project Deadline

Bar Plots

```
>> bar(rand(10,5),'stacked');
>> colormap(cool);
```
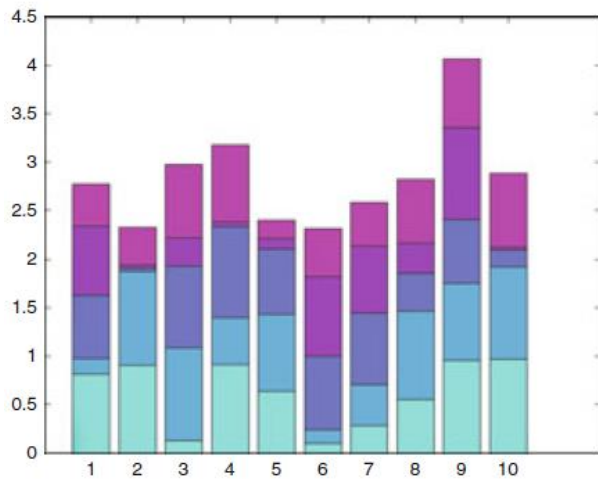


```
x=[1,4,5,8];
RT=[1.2,1.4,1.9,2.3];
SD=[0.1,0.15,0.25,0.4];
bar(x,RT,'w');  hold on;
errorbar(x,RT,SD,'.k');
```
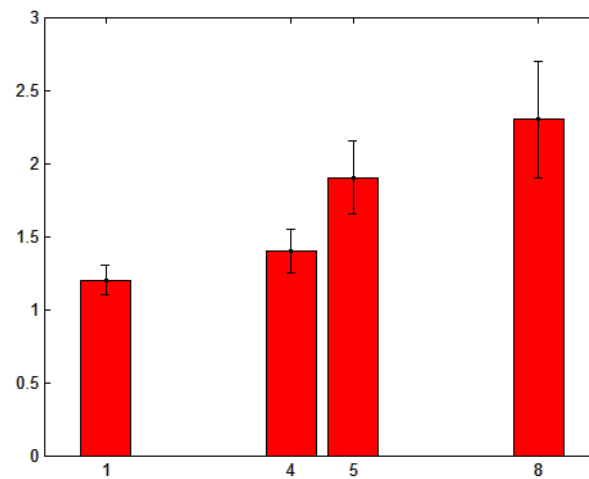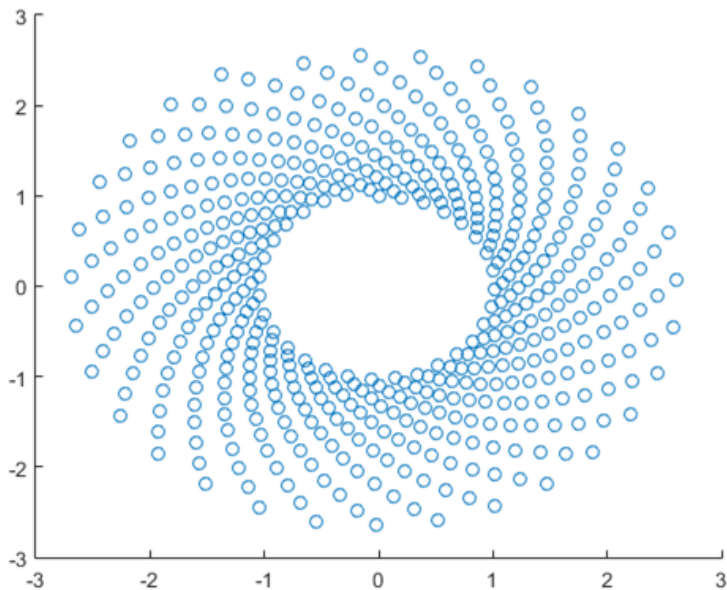


```
Ages=[22,25,23,22,45,12,34,33,21];
[N,xc]=hist(Ages,3);
bar(xc,N);
```
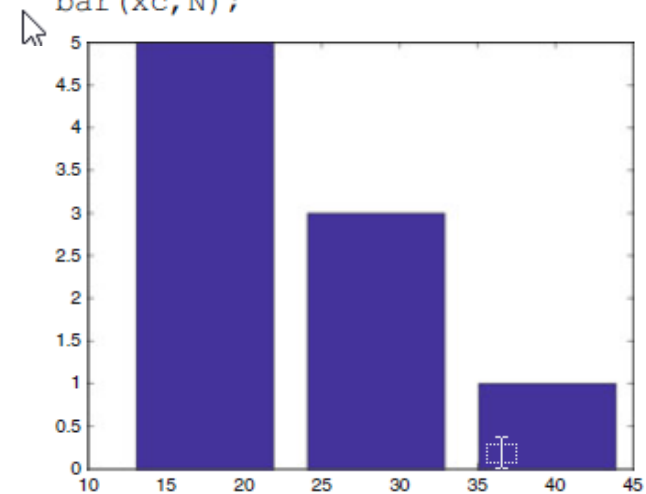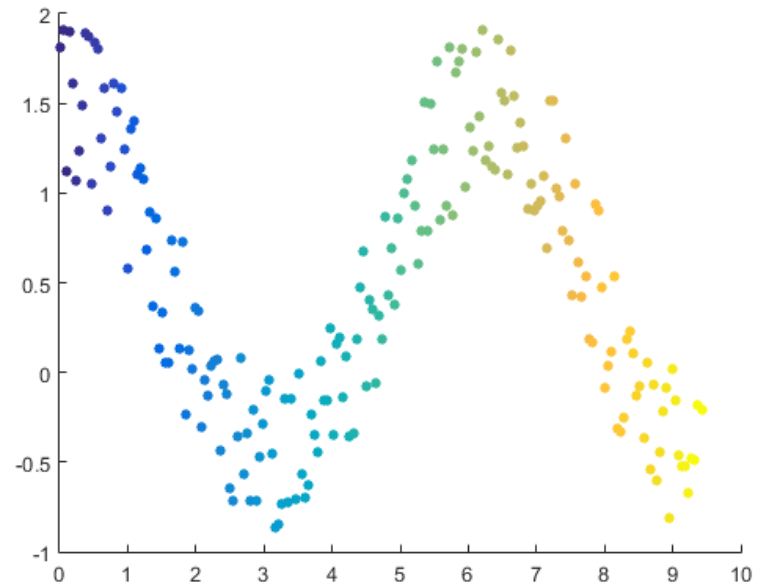
Scatter Plots

```
theta = linspace(0,1,500);
x = exp(theta).*sin(100*theta);
y = exp(theta).*cos(100*theta);
s = scatter(x,y);
```
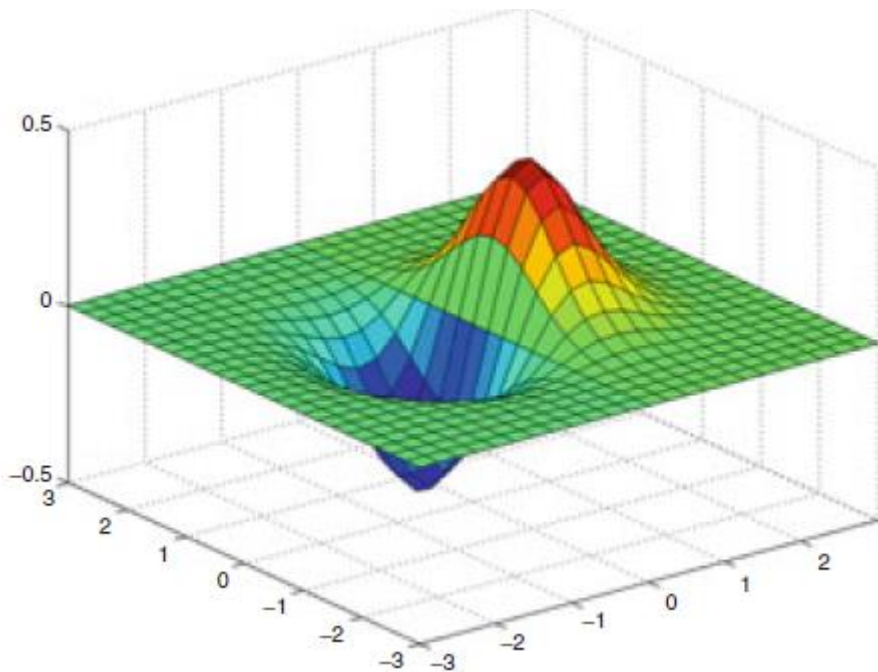
```
x = linspace(0,3*pi,200);
y = cos(x) + rand(1,200);
a = 25;
c = linspace(1,10,length(x));
scatter(x,y,a,c,'filled')
```
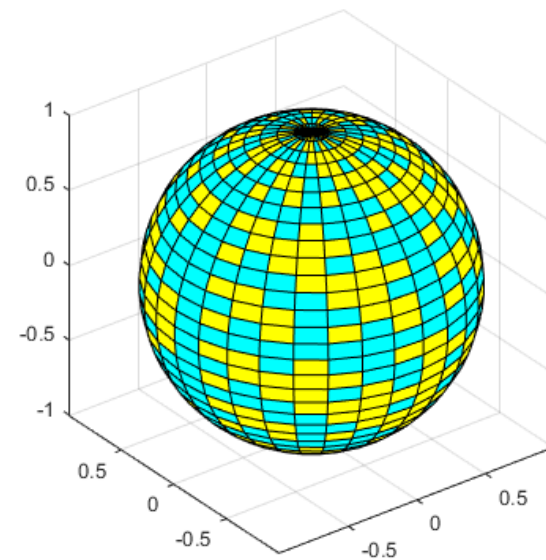
3D Plotting

```
>> a=[-3:0.25:3];
>> b=[-3:0.25:3];
>> [X,Y]=meshgrid(a,b);
>> Z= X.*exp(-X.^2-Y.^2);
>> surf(X,Y,Z);
```
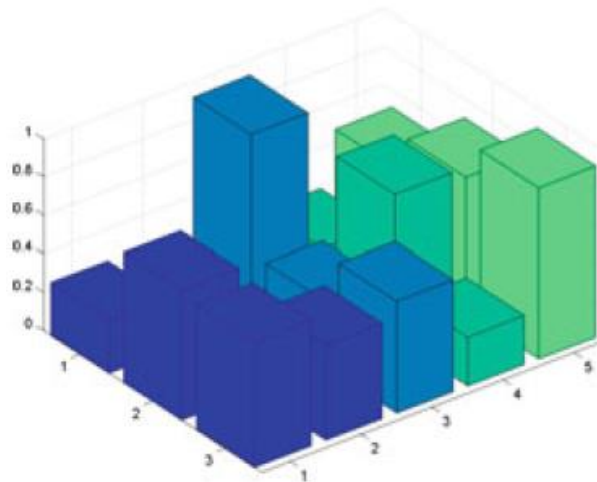
```
k = 5;
n = 2^k-1;
[x,y,z] = sphere(n);
c = hadamard(2^k);

figure
surf(x,y,z,c);
colormap([1  1  0; 0  1  1])
axis equal
```
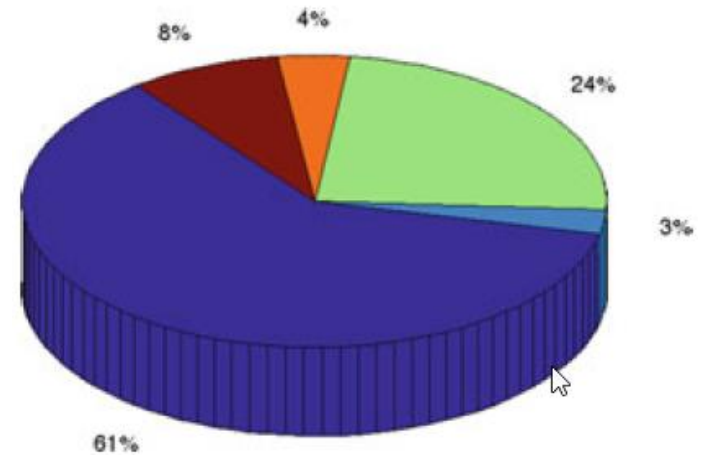
3D Plotting

```
>> y=rand(3,5);
>> bar3(y);
>> colormap(winter);
```
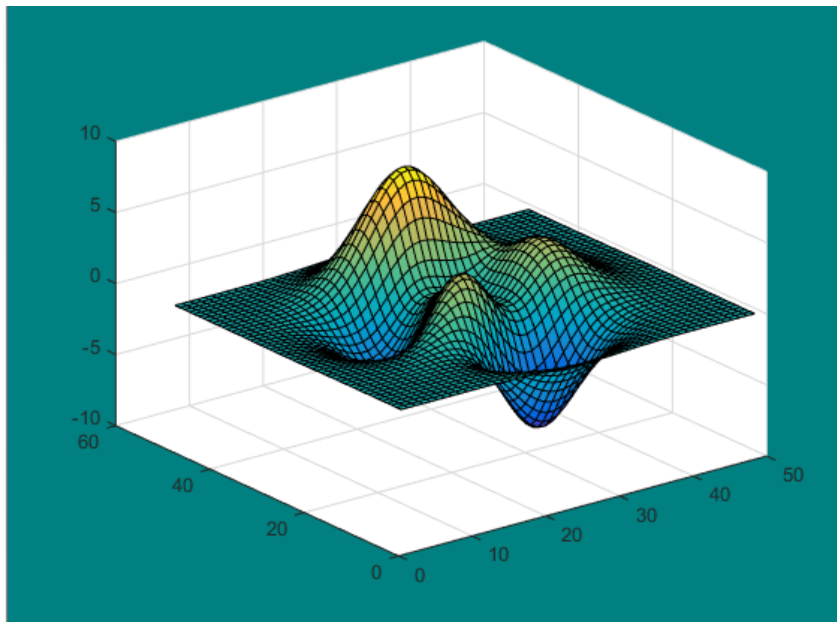


```
>> y=rand(5,1);
>> pie3(y);
>> axis square; grid off;
```
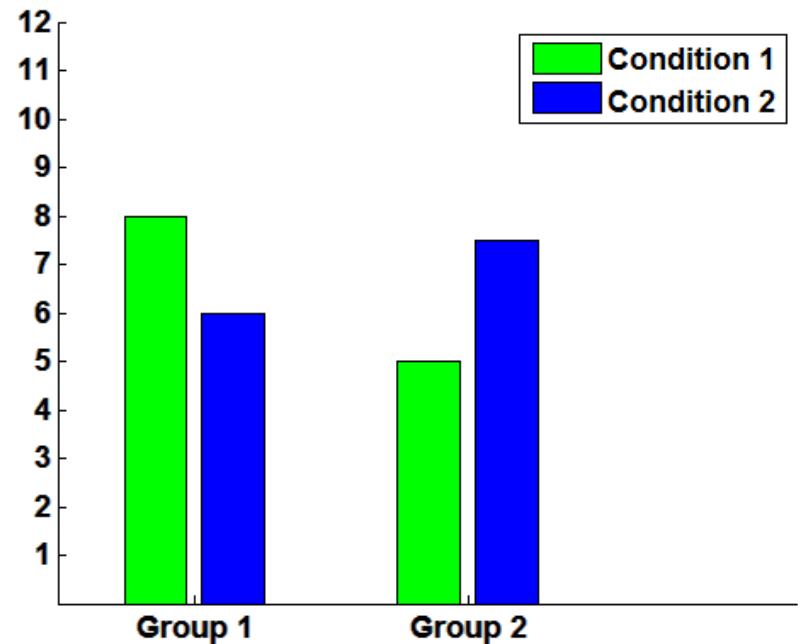
Graphics Handles

```matlab
surf(peaks)
fig = gcf; % current figure handle
fig.Color = [0 0.5 0.5];
fig.ToolBar = 'none';
```

```matlab
h=bar(data);
set(gca,'FontWeight','Bold','FontSize',14);
set(gca,'XTickLabel',{'Group 1','Group 2'})
set(gca,'YTick',1:12);
set(h(1),'FaceColor','g','LineWidth',1.2);
set(h(2),'FaceColor','b','LineWidth',1.2);
```
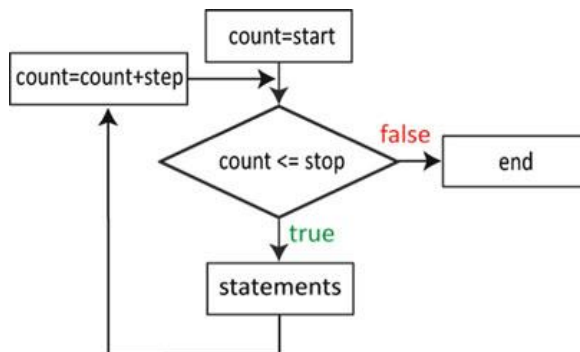
Control Flow Statements

```
if condition1
        Statements1
elseif condition2
        Statements2
elseif condition3
        Statements3
else
        Statements4
end
```
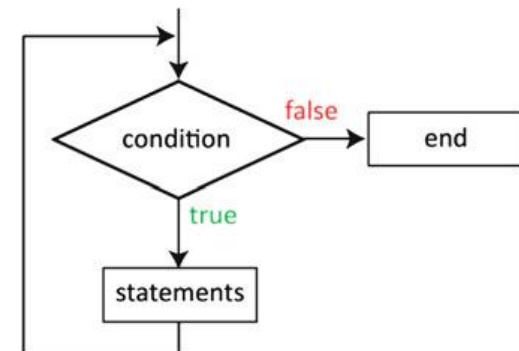
```
switch condition
    case fact1
            Statements1
    case fact2
            Statements2
    case fact3
            Statements3
    otherwise
            StatementsOtherwise
end
```

```
for count = start:step:stop;
    statements
end;
```



```
while condition
    statements
end
```

Control Flow Statements

```
limit = 0.8;
s = 0;

while 1
    tmp = rand;
    if tmp > limit
        break
    end
    s = s + tmp;
end
```

```
try
    statements
catch
    statements
end
```

References

- **MATLAB for Psychologists (2012),** Borgo, M., Soranzo, A., Grassi, M., Springer-Verlag, 2012, ISBN. 978-1-4614-2196-2.

  - Chapter 3-4., pp. 47-82.

- **MATLAB for Neuroscientists, 2ⁿᵈ Ed: An Introduction to Scientific Computing (2014),** *Wallisch, P., Lusignan, M.E., Benayoun, M.D., Baker, T.I., Dickey, A.S. and Hatsopoulos, N.G.,* Academic Press, ISBN. 978-0123838360.

  - Chapter 2. pp. 7-114.

- **MATLAB help:**
  - http://www.mathworks.com/help/matlab/ref/subplot.html
  - http://www.mathworks.com/help/matlab/ref/surf.html
  - http://www.mathworks.com/help/matlab/ref/scatter.html
  - http://www.mathworks.com/help/matlab/ref/gcf.html