**Lösung 1:**

```
>> V=[1 4 6 2]
V =
     1     4     6     2
>> W=[0;4;-1;-3]
W =
     0
     4
    -1
    -3
```

**Lösung 2:**

```
>> V*W
ans =
     4
>> V'*W
Error using  *
Inner matrix dimensions must agree.
>> V*W'
Error using  *
Inner matrix dimensions must agree.
>> V'*W'
ans =
     0     4    -1    -3
     0    16    -4   -12
     0    24    -6   -18
     0     8    -2    -6
```

**Lösung 3:**

```
>> W*V
ans =
     0     0     0     0
     4    16    24     8
    -1    -4    -6    -2
    -3   -12   -18    -6
>> W'*V
Error using  *
Inner matrix dimensions must agree.
>> W*V'
```

```
Error using  *
Inner matrix dimensions must agree.
>> W'*V'
ans =
     4
```

**Lösung 4:**

```
>> U=4:1:8
U =
     4     5     6     7     8
>> W=(2:0.2:3.4)'
W =
    2.0000
    2.2000
    2.4000
    2.6000
    2.8000
    3.0000
    3.2000
    3.4000
```

**Lösung 5:**

```
>> length(U)
ans =
     5
>> length(W)
ans =
     8
>> size(U)
ans =
     1     5
>> size(W)
ans =
     8     1
```

**Lösung 6:**

```
>> U=[1 4 5 6 7 8 9 10]
U =
     1     4     5     6     7     8     9    10
```

```
>> W=U(3:7)
W =
     5     6     7     8     9
```

**Lösung 7:**

```
B=[1 2]
C=[3;-1]
A1=[B;C']
A2=[B',C]
A3=[C';B]
```

**Lösung 8:**

```
>> A1+A2
ans =
     2     5
     5    -2
>> A3+4
ans =
     7     3
     5     6
A1*A2
ans =
     5     1
     1    10
A1.*A2
ans =
     1     6
     6     1
```

**Lösung 9:**

```
>> clear all
>> A(1,1,1)=(1+1)/1
A =
     2
>> A(2,4,1)=(2+4)/1
A =
     2     0     0     0
     0     0     0     6
>> A(2,2,3)=(2+2)/1+(2+2)/2+(2+2)/3
```

```
A(:,:,1) =
     2     0     0     0
     0     0     0     6
A(:,:,2) =
     0     0     0     0
     0     0     0     0
A(:,:,3) =
         0          0          0          0
         0     7.3333          0          0
```

**Lösung 10:**

first.m:

```
clear all

B=(1 2)
C=(3;-1)

A1=(B; C')
A2=(B' C)
A3=(C'; B)

A1+A2
A3+4
A1*A2
A1.*A2
```

```
>> pwd

ans =

$(path)/MatlabCrashkurs

>> ls
first.m
```

**Lösung 11:**

loop.m:

```
s=0;
for i=1:10
   s = s+i;
end display(s);
```

Ergebnis:

```
>> loop
s =
     55
```

**Lösung 12:**

`loop.m:`

```
s=0;
for i=1:5
   for j=4:10
      s = s+i+j;
   end
end

display(s);
```

Ergebnis:

```
>> loop
s =
     350
```

**Lösung 13:**

`loop.m:`

```
for i=1:20
   for j=1:40
      for k=1:30
         A(k,i,j) = 0;
         for l=1:k
            A(k,i,j) = A(k,i,j) + (i+j)/factorial(l);
         end
      end
   end
end
```

An Stelle der Funktion `factorial` könnten wir auch noch eine `for`-Schleife einbauen:

loop.m:

```
for i=1:20
  for j=1:40
    for k=1:30
      A(k,i,j) = 0;
      for l=1:k
        fac=1;
        for m=2:l
          fac = fac*m;
        end
        A(k,i,j) = A(k,i,j) + (i+j)/fac;
      end
    end
  end
end
```

**Lösung 14:**

```
>> size(A)
ans =
    30    20    40
```

**Lösung 15:**

```
>> B=A(1,4:8,10:12)
B(:,:,1) =
    14    15    16    17    18
B(:,:,2) =
    15    16    17    18    19
B(:,:,3) =
    16    17    18    19    20
```

**Lösung 16:**

MyPlot.m:

```
clear all
close all

N=10;
h=1/(N-1); % Die Laenge eines Intervalls ist das Inkrement fuer x
x=0:h:1
```

Ergebnis:

```
>> MyPlot
x =
  Columns 1 through 8
    0  0.1111  0.2222  0.3333  0.4444  0.5556  0.6667  0.7778
  Columns 9 through 10
    0.8889  1.0000
>> length(x)
ans =
    10
```

**Lösung 17:**

MyPlot.m:

```
N=10;
h=1/(N-1); x=0:h:1;

u=exp(x);
plot(x,u);
```

**Lösung 18:**

MyPlot.m:

```
N=10;
h=1/(N-1); x=0:h:1;

u=exp(x);
y=x.^2;
v=y.*u;
plot(x,y,x,u,x,v);
```

**Lösung 19:**

```
plot(x,y,'k-',x,u,'m--',x,v,'rs--');
title('Beispielgraphik');
xlabel('x-Achse');
ylabel('y-Achse');
```

oder

```
plot(x,y,'k-',x,u,'m--','LineWidth',2);
hold on
plot(x,v,'rs--');
title('Beispielgraphik');
xlabel('x-Achse');
ylabel('y-Achse');
```

**Lösung 20:**

```
subplot(2,2,1) % 2 Zeilen, 2 Spalten, 1. Graphik links oben
plot(x,v,'rs--');
title('Titel 1');
xlabel('x-Achse, rot');
ylabel('y-Achse');
subplot(2,2,2) % 2 Zeilen, 2 Spalten, 2. Graphik rechts oben
plot(x,y,'k-','LineWidth',2);
title('Titel 2');
xlabel('x-Achse, schwarz');
ylabel('y-Achse');
subplot(2,2,4) % 2 Zeilen, 2 Spalten, 3. Graphik rechts unten
plot(x,u,'m--','LineWidth',2);
title('Titel 3');
xlabel('x-Achse, magenta');
ylabel('y-Achse');
```

**Lösung 21:**

```
>> ones(2,3)
ans =
     1     1     1
     1     1     1
>> ones(4)
ans =
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
>> zeros(1,5)
ans =
     0     0     0     0     0
```

**Lösung 22:**

```
>> A=[[2 1 -4 8];[0 3 0 -2];[5 4 6 2];[6 -1 1 0]];
>> V=[1;4;6;8];
>> diag(A)
ans =
     2
     3
     6
     0
>> diag(V)
ans =
     1     0     0     0
     0     4     0     0
     0     0     6     0
     0     0     0     8
>> diag(diag(A))
ans =
     2     0     0     0
     0     3     0     0
     0     0     6     0
     0     0     0     0
>> diag(V,1)
ans =
     0     1     0     0     0
     0     0     4     0     0
     0     0     0     6     0
     0     0     0     0     8
     0     0     0     0     0
>> diag(V,-2)
ans =
     0     0     0     0     0     0
     0     0     0     0     0     0
     1     0     0     0     0     0
     0     4     0     0     0     0
     0     0     6     0     0     0
     0     0     0     8     0     0
>> eye(3)
ans =
     1     0     0
     0     1     0
     0     0     1
>> eye(2,3)
ans =
     1     0     0
```

```
     0     1     0
```

**Lösung 23:**

```
>> A=eye(4)*2
A =
     2     0     0     0
     0     2     0     0
     0     0     2     0
     0     0     0     2
>> B=diag(ones(1,3),1)*3
B =
     0     3     0     0
     0     0     3     0
     0     0     0     3
     0     0     0     0
>> C=diag(ones(1,3),1)*3-diag(ones(1,3),-1)
C =
     0     3     0     0
    -1     0     3     0
     0    -1     0     3
     0     0    -1     0
```

**Lösung 24:**

(s. Aufgabe)

**Lösung 25:**

```
a=2; b=0;
display(((a& ~(a|b))| ~a)&b);
```

**Lösung 26:**

(s. Aufgabe)

**Lösung 27:**

(s. Aufgabe)

**Lösung 28:**

(s. Aufgabe)

**Lösung 29:**

(s. Aufgabe)

**Lösung 30:**

MyProg.m:

```
MySinExp = @(x) sin(exp(x));

I=[1 4];
N=100;
h=(I(2)-I(1))/(N-1);
x=I(1):h:I(2);
y=MySinExp(x);
plot(x,y)
```

**Lösung 31:**

MySin.m:

```
function y=MySin(x)

y = sin(x);

end
```

**Lösung 32:**

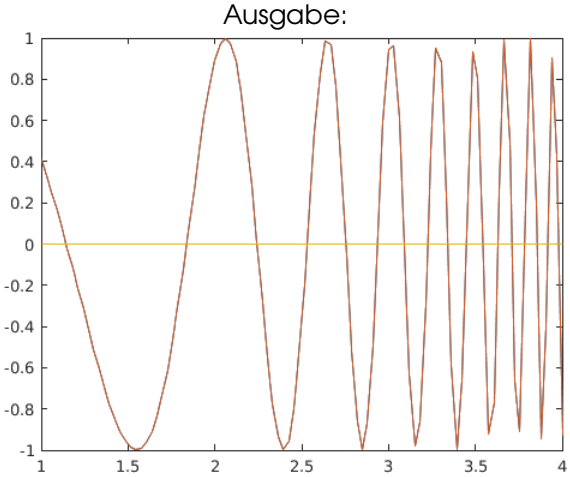
MySin.m:

```
function y=MySin(x)

y = sin(MyExp(x));

end

function y=MyExp(x)

y = exp(x);

end
```

MyProg.m:

```
MySinExp = @(x) sin(exp(x));

I=[1 4];
N=100;
h=(I(2)-I(1))/(N-1);
x=I(1):h:I(2);
y=MySinExp(x);
u=MySin(x);
plot(x,y,x,u,x,u-y)
```

Ausgabe:




**Lösung 33:**

dSin.m:

```
function y=dSin(x,k)

if mod(k,2)==0
   y=sin(x);
else
   y=cos(x);
end

if mod(k,4)==2 || mod(k,4)==3
   y = -y;
end

end
```

bla.m:

```
I=[0 2*pi];
N=100;
h=(I(2)-I(1))/(N-1);
x=I(1):h:I(2);
y=dSin(x,0);
y1=dSin(x,1);
y2=dSin(x,2);

plot(x,y,'m-',x,y1,'r-',x,y2,'b-')
```

Ausgabe: