

```
clear
close all
clc
```

Aufgabe 5 (a): Risikomanagment

```
rng('shuffle')
N=1000;
X=rand(3,N);
x=zeros(4,N);
risk=[0.1 0.05 0.2];

% Risiken mit Wahrscheinlichkeiten in Matrix x
x(1,X(1,:)<0.1)=3;
x(2,X(2,:)<0.05)=10;
x(3,X(3,:)<0.2)=1;
x(4,:)=sum(x);

x_means = mean(x') % Mittelwerte
```

```
x_means = 1x4
    0.3270    0.5000    0.2070    1.0340
```

```
x_sum_means = sum(x_means(1:3)) % Summe der Mittelwerte (=Mittelwert der Summe)
```

```
x_sum_means = 1.0340
```

```
x_var = var(x') % Varianzen
```

```
x_var = 1x4
    0.8749    4.7548    0.1643    5.7906
```

```
x_sum_var = sum(x_var(1:3)) % Summe der Varianzen
```

```
x_sum_var = 5.7940
```

Aufgabe 5 (b): Zufallsmatrix

```
rng('shuffle');
X=rand(50,20); % 50x20 Zufallsmatrix erzeugen
% Mittelwerte und Varianzen der einzelnen Spalten berechnen
X_mean = mean(X)
```

```
X_mean = 1x20
    0.4870    0.5335    0.5509    0.5455    0.5110    0.5051    0.5440    0.5567 ...
```

```
X_var = var(X)
```

```
X_var = 1x20
    0.0732    0.0941    0.0806    0.1031    0.1037    0.0813    0.0886    0.0829 ...
```

```
% Mittelwert und Varianz der Spaltenmittelwerte
X_mean_mean = mean(X_mean)
```

```
X_mean_mean = 0.5156
```

```
X_mean_var = var(X_mean)
```

```
X_mean_var = 0.0016
```

```
% Mittelwert und Varianz der Spaltenvarianzen
```

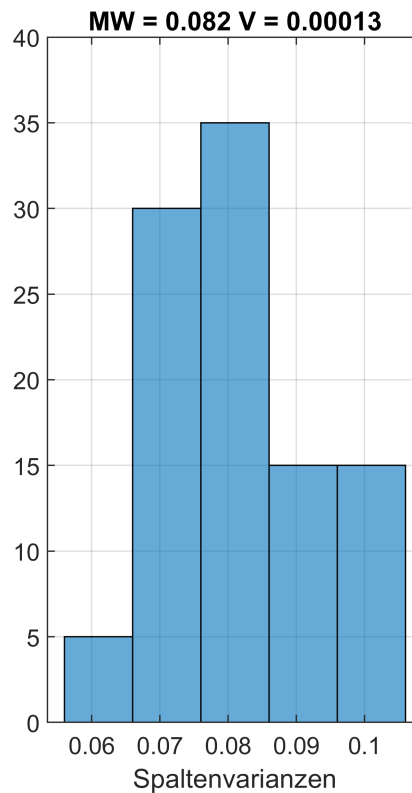
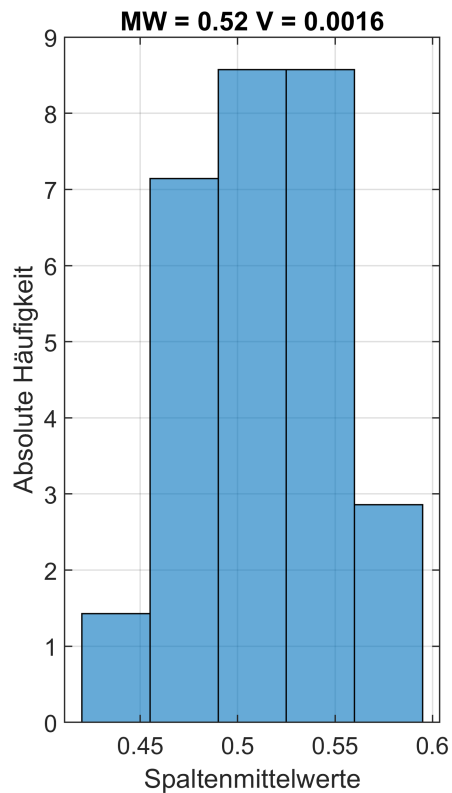
```
X_var_mean = mean(X_var)
```

```
X_var_mean = 0.0819
```

```
X_var_var = var(X_var)
```

```
X_var_var = 1.2924e-04
```

```
figure
subplot(121)
histogram(X_mean,'NumBins',5,'Normalization','pdf')
grid on
title(['MW = ', num2str(X_mean_mean,2), ' V = ', num2str(X_mean_var,2) ]);
ylabel('Absolute Häufigkeit');
xlabel('Spaltenmittelwerte'),
subplot(122)
histogram(X_var,'NumBins',5,'Normalization','pdf')
grid on
xlabel('Spaltenvarianzen'),
title(['MW = ', num2str(X_var_mean,2), ' V = ', num2str(X_var_var,2) ]);
```



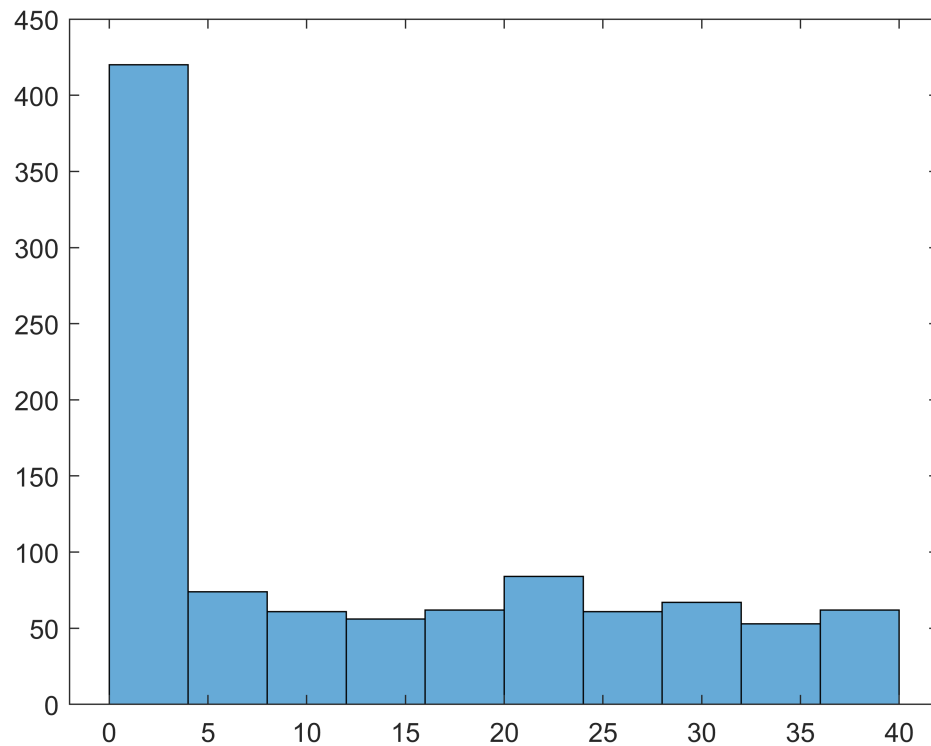
Aufgabe 5 (c): Ampelwartezeit

```
close
```

```

rng('shuffle')
n=1000;
X=rand(n,1);
W=60*(X-1/3); % Wartezeit
W(X<1/3)=0; % Wartezeit 0 setzen
% Verteilungsfunktion
figure
histogram(W,10)

```



```
W_mean = mean(W)
```

```
W_mean = 12.6912
```

```

figure
histogram(W,'Normalization','cdf')
hold on
cdfplot(W) % empirische Verteilung
hold off
title('Verteilungsfunktion')
legend('Histogramm','empirisch','Location','best')

```

