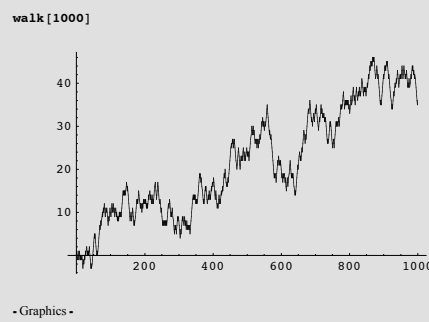
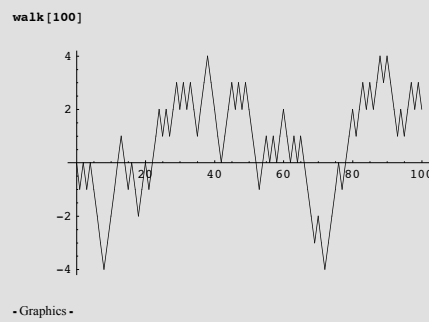
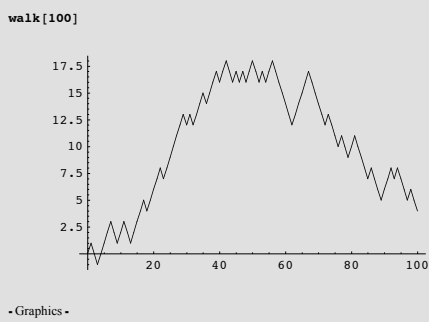
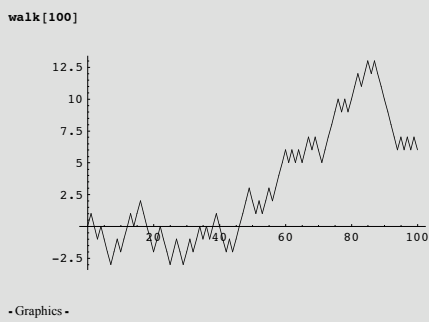
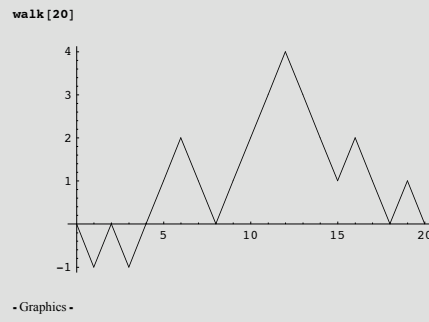
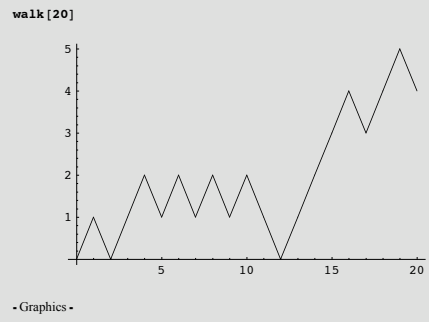
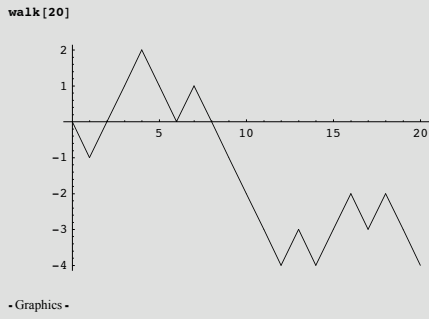
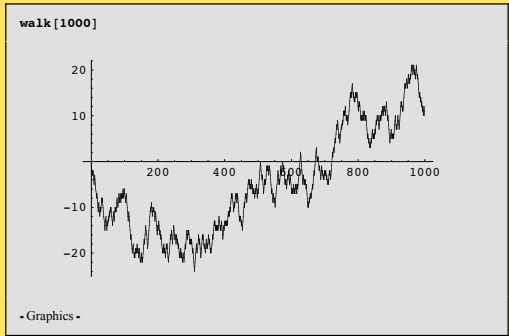
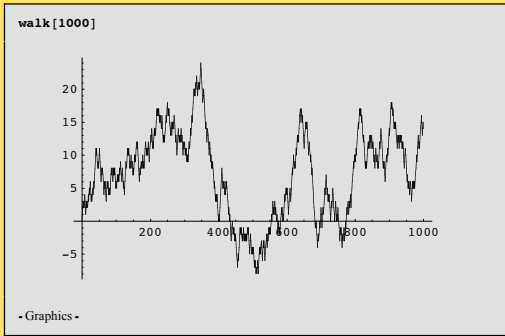


### Worksheet zu Gambler's ruin

Symmetrischer random walk  
(Wahrscheinlichkeit  $1/2$  für *up* und für *down*)

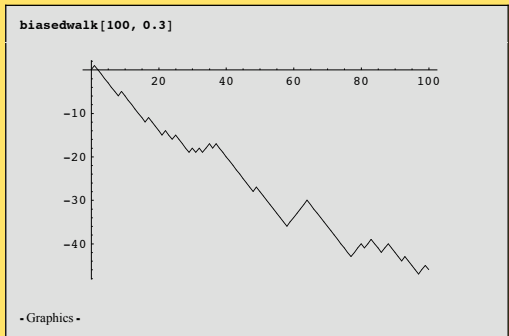
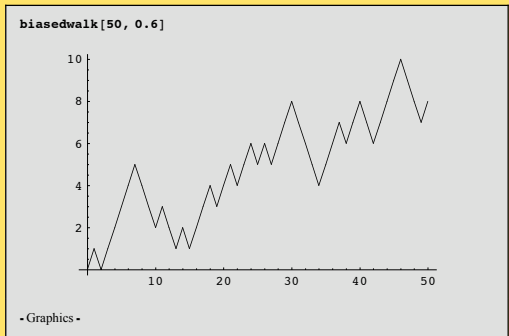
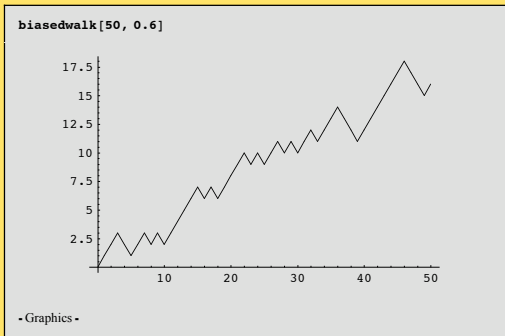
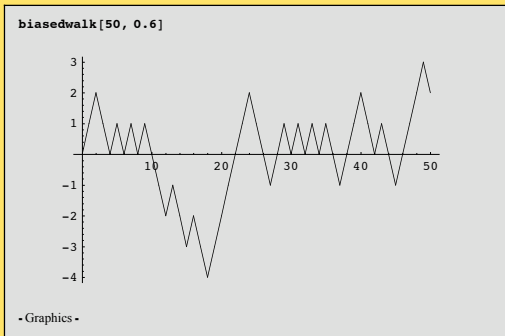
```
walk[n_] :=
Module[{S, T},
T = Table[Random[Integer, {0, 1}], {i, 1, n}] /. 0 -> -1;
S = Table[{k, Sum[T[[j]], {j, 1, k}]}, {k, 0, n}];
ListPlot[S, PlotJoined -> True]
]
```



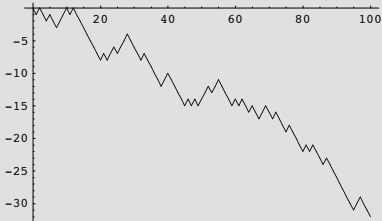


Random walk mit bias  
(Wahrscheinlichkeit  $p$  für *up* und  $1 - p$  für *down*)

```
biasedwalk[n_, p_] :=
Module[{S, T},
T = Map[Function[x, Sign[p - x]],
Table[Random[Real, {0, 1}, 3], {i, 1, n}]];
S = Table[{k, Sum[T[[j]], {j, 1, k}], {k, 0, n}}];
ListPlot[S, PlotJoined -> True]
]
```

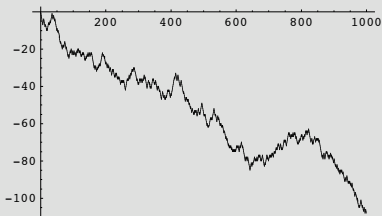


biasedwalk[100, 0.3]



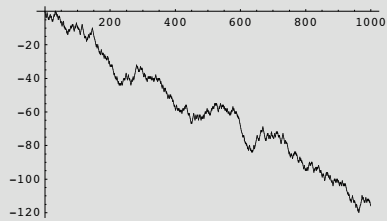
-Graphics-

biasedwalk[1000, 0.45]



-Graphics-

biasedwalk[1000, 0.45]



-Graphics-

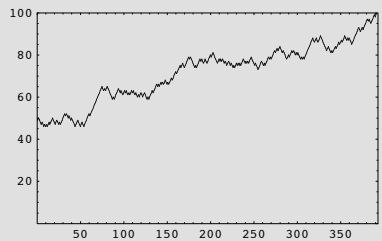
Gambler's ruin

unteres Niveau ("Ruin") = *low*oberes Niveau ("Gewinn") = *high*Bias mit up – Wahrscheinlichkeit = *prob*Startkapital = *offset*Zeitbeschränkung = *bound*

```
sumit[a_, low_, high_, offset_] :=
Module[{l, s, i, b},
  ll = Length[a];
  s = offset;
  b = Append[{}, offset];
  i = 1;
  While[(s > low && s < high && i < ll),
    {s = s + a[[i]]; b = Append[b, s]; i++};
  b
]
```

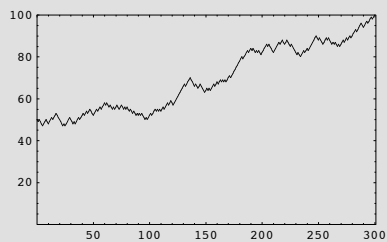
```
gambler[low_, high_, start_, prob_, bound_] :=
Module[{}],
  If[prob ≤ 0 || prob ≥ 1, Error];
  If[start ≤ low || start ≥ high, Error];
  S = Map[Function[x, Sign[prob - x]],
    Table[Random[Real, {0, 1}, 3], {i, 1, bound}]];
  T = sumit[S, low, high, start];
  t = Length[T];
  U = Table[{k - 1, T[[k]]}, {k, 1, t}];
  ListPlot[U, PlotJoined → True,
    PlotRange → {{0, Length[T]}, {low, high}}, Frame → True]
]
```

gambler[0, 100, 50, 0.55, 1000]



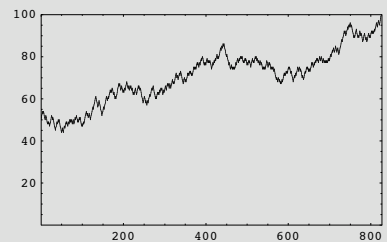
-Graphics-

gambler[0, 100, 50, 0.55, 1000]



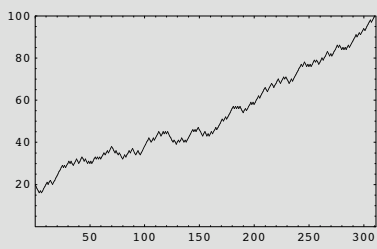
-Graphics-

gambler[0, 100, 50, 0.55, 1000]



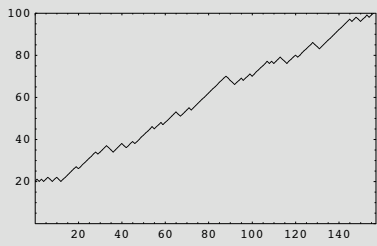
-Graphics-

gambler[0, 100, 20, 0.65, 1000]



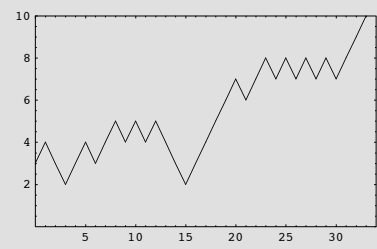
- Graphics -

gambler[0, 100, 20, 0.65, 1000]



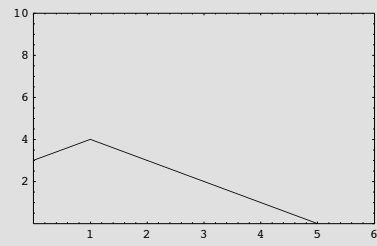
- Graphics -

gambler[0, 10, 3, 0.55, 1000]



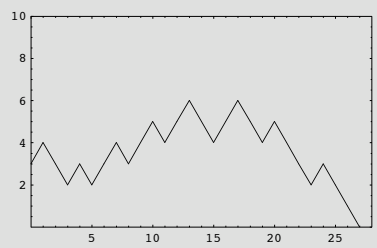
- Graphics -

gambler[0, 10, 3, 0.55, 1000]



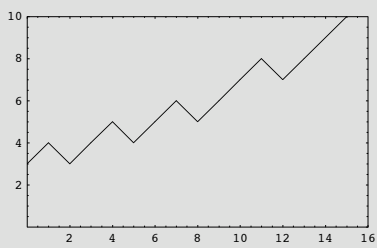
- Graphics -

gambler[0, 10, 3, 0.55, 1000]



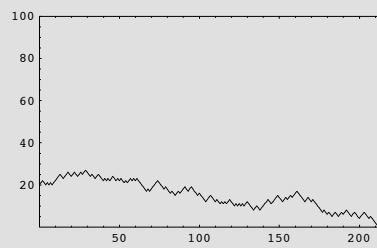
- Graphics -

gambler[0, 10, 3, 0.55, 1000]



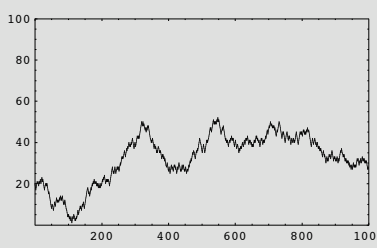
- Graphics -

gambler[0, 100, 20, 0.51, 1000]

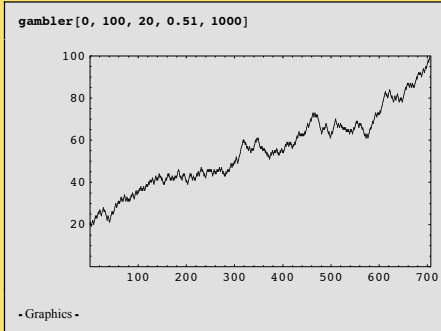


- Graphics -

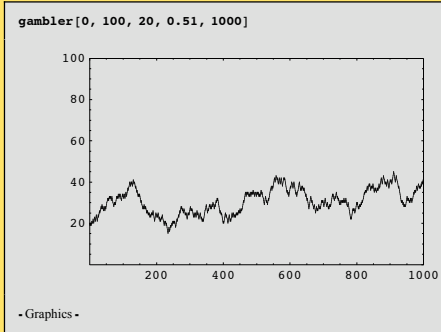
gambler[0, 100, 20, 0.51, 1000]



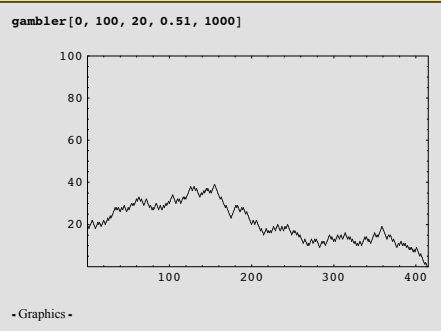
- Graphics -



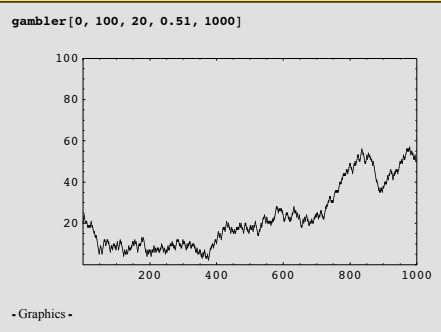
- Graphics -



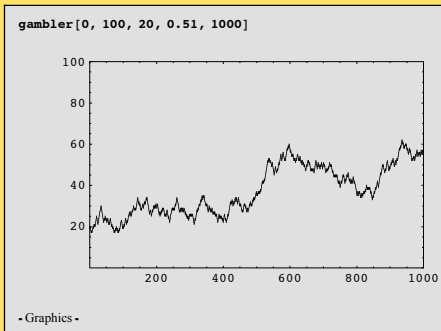
- Graphics -



- Graphics -



- Graphics -



- Graphics -