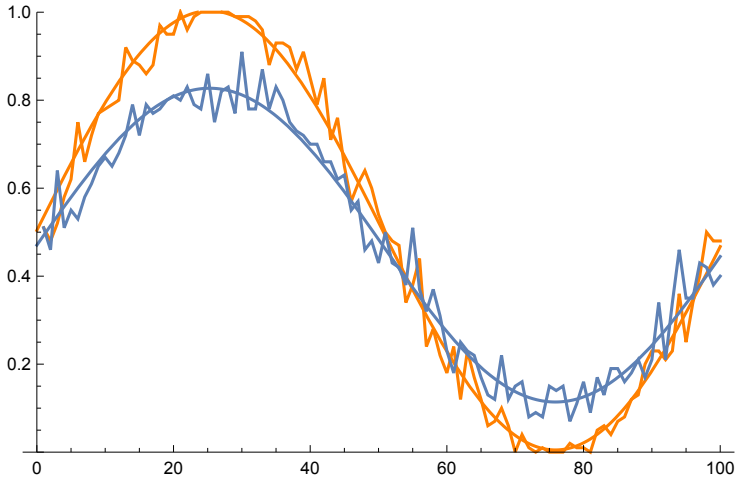
```
(* Plots a regular Ramsey sine result vs one with state destruction probability
 sdp. ϕ is x axis variable (0 to 2π) in numpts steps. z is the number
 of measurements per point. A is the default sinusoid amplitude. *)

sdp = 0.3;
ϕ = 0;
ϕ2 = 0;
z = 100;
numpts = 100;
A = 1;

sdpSine = Table[
   n = Total[Table[If[RandomReal[] < sdp, If[RandomReal[] < 3/4, RandomInteger[], 0],
        Boole[RandomReal[] < 1/2 (1 + A * Sin[ϕ])]], {i, 1, z}]];
   ϕ = ϕ + 2 π/numpts;
   ave = n/z;
   ave, {i, 1, numpts}];

regSine = Table[
   n = Total[Table[If[RandomReal[] < 0, If[RandomReal[] < 3/4, RandomInteger[], 0],
        Boole[RandomReal[] < 1/2 (1 + A * Sin[ϕ2])]], {i, 1, z}]];
   ϕ2 = ϕ2 + 2 π/numpts;
   ave = n/z;
   ave, {i, 1, numpts}];

(* Find a curve fit and plot *)

regSineLine =
 FindFit[regSine, {m + amp * Sin[B p], {m < 0.55, amp > 0.001, B < 1}}, {m, amp, B}, p]
sdpSineLine = FindFit[sdpSine,
  {m + amp * Sin[B p], {m < 0.55, amp > 0.001, B < 1}}, {m, amp, B}, p]
Show[ListLinePlot[regSine, PlotRange → {0, 1}, PlotStyle → Orange],
 Plot[m + amp * Sin[B p] /. regSineLine,
  {p, 0, 100}, PlotRange → {0, 1}, PlotStyle → Orange],
 ListLinePlot[sdpSine, PlotRange → {0, 1}],
 Plot[m + amp * Sin[B p] /. sdpSineLine, {p, 0, 100}, PlotRange → {0, 1}]]
```

```
{m → 0.504064, amp → 0.499073, B → 0.0620928}

{m → 0.470577, amp → 0.356583, B → 0.0621024}
```




```
(* Now plotting the ratio of the sdp sine to regular sine as
 a function of increasing sdp, from 0 → 1, in numptsSDP steps.*)

Clear[sdp, ϕ, ϕ2, z, A, numpts, numptsSDP, sdpSineData,
 regSineData, RatioData, regSineLine, sdpSineLine, a, b, m, amp, B]

sdp = 0;
ϕ = 0;
ϕ2 = 0;
z = 100;
A = 1;
numpts = 100;
numptsSDP = 100;


RatioData = Table[

   sdpSineData = Table[
     n = Total[Table[If[RandomReal[] < sdp, If[RandomReal[] < 3/4, RandomInteger[],
          0], Boole[RandomReal[] < 1/2 (1 + A * Sin[ϕ])]], {i, 1, z}]];
     ϕ = ϕ + 2 π/numpts;
```

```
    ave = n/z;
    ave, {i, 1, numpts}];

  regSineData = Table[
    n = Total[Table[If[RandomReal[] < 0, If[RandomReal[] < 3/4, RandomInteger[], 0],
        Boole[RandomReal[] < 1/2 (1 + A * Sin[ϕ2])]], {i, 1, z}]];
    ϕ2 = ϕ2 + 2 π/numpts;
    ave = n/z;
    ave, {i, 1, numpts}];

  regSineLine = FindFit[regSineData,
    {m + amp * Sin[B p], {m < 0.55, amp > 0.01, B < 1}}, {m, amp, B}, p] ;
  sdpSineLine = FindFit[sdpSineData, {m + amp * Sin[B p],
     {m < 0.55, amp > 0.01, B < 1}}, {m, amp, B}, p] ;


  sdpMax = FindMaximum[m + amp * Sin[B p] /. sdpSineLine, p][[1]];
  regMax = Max[regSineData];
  ratio = sdpMax / regMax;

  sdp = sdp + 1/numptsSDP;
  ratio, {i, 1, numptsSDP}];


Show[ ListLinePlot[{RatioData}, PlotRange → {0.3, 1}, PlotStyle → Orange] ]

(*line = FindFit[data1, a+ b x, {a,b},x];
Plot[a + 100 b x /. line, {x,0,1}]*)
```

FindFit: Failed to converge to the requested accuracy or precision within 500 iterations.

FindMaximum: The line search decreased the step size to within the tolerance specified by AccuracyGoal and PrecisionGoal but was unable to find a sufficient increase in the function. You may need more than MachinePrecision digits of working precision to meet these tolerances.

FindFit: Failed to converge to the requested accuracy or precision within 500 iterations.

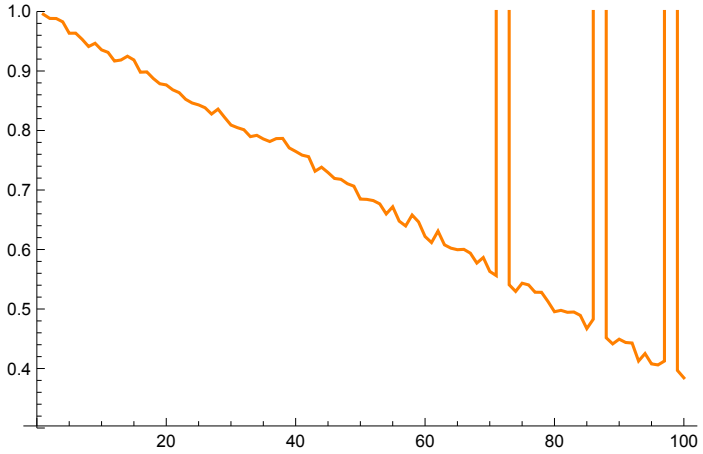
FindMaximum: The line search decreased the step size to within the tolerance specified by AccuracyGoal and PrecisionGoal but was unable to find a sufficient increase in the function. You may need more than MachinePrecision digits of working precision to meet these tolerances.

FindMaximum: The line search decreased the step size to within the tolerance specified by AccuracyGoal and PrecisionGoal but was unable to find a sufficient increase in the function. You may need more than MachinePrecision digits of working precision to meet these tolerances.

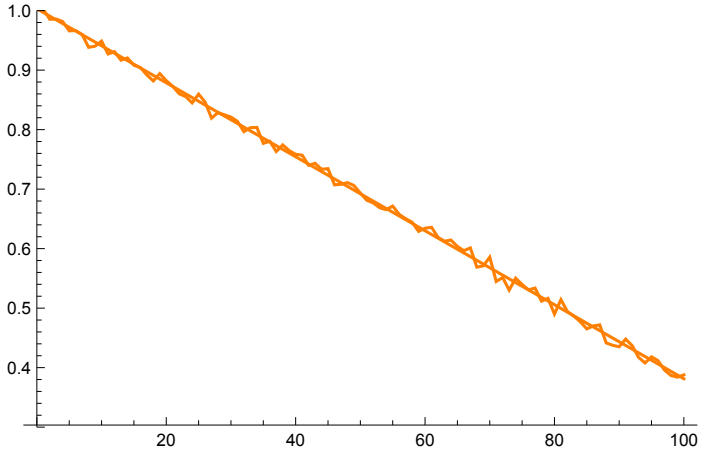
General: Further output of FindMaximum::lstol will be suppressed during this calculation.

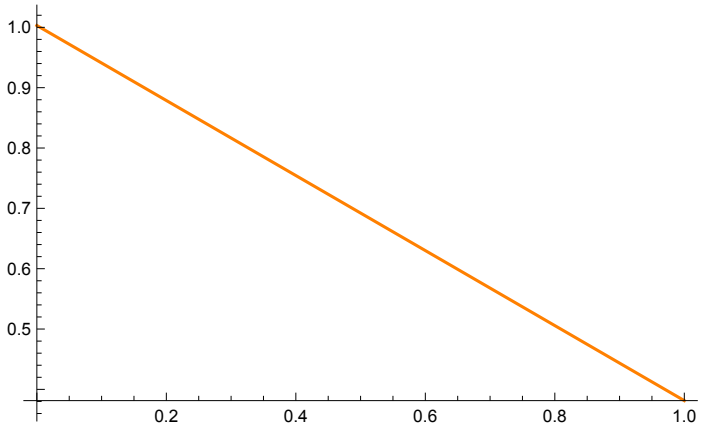
FindFit: Failed to converge to the requested accuracy or precision within 500 iterations.

General: Further output of FindFit::cvmit will be suppressed during this calculation.



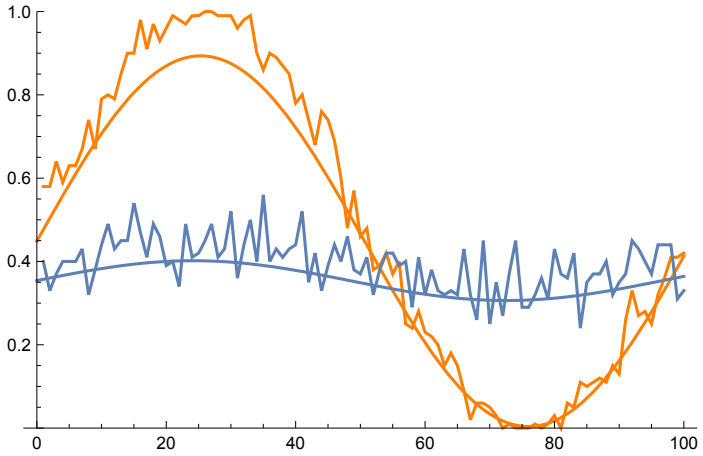
```
RatioDataCopy = RatioData
RatioLine = FindFit[RatioDataCopy, a + b x, {a, b}, x];

Show[
 ListLinePlot[{RatioDataCopy}, PlotRange → {0.3, 1}, PlotStyle → Orange],
 Plot[a + b x /. RatioLine, {x, 0, 100}, PlotStyle → Orange]
]

Plot[a + 100 b x /. RatioLine, {x, 0, 1}, PlotStyle → Orange]

RatioLine
```




```
{a → 1.00308, b → -0.00621717}

(* {a→1.0030777951336836`,b→-0.006217172008373215`} *)
```

```
oamp = 0.9;
Show[ListLinePlot[regSine, PlotRange → {0, 1}, PlotStyle → Orange],
 Plot[oamp * (m + amp * Sin[B p]) /. regSineLine,
  {p, 0, 100}, PlotRange → {0, 1}, PlotStyle → Orange],
 ListLinePlot[sdpSine, PlotRange → {0, 1}],
 Plot[oamp * (m + amp * Sin[B p]) /. sdpSineLine, {p, 0, 100}, PlotRange → {0, 1}]]
```




```
FindMaximum[oamp * (m + amp * Sin[B p]) /. sdpSineLine, p][[1]] /
 FindMaximum[oamp * (m + amp * Sin[B p]) /. regSineLine, p][[1]]
```

```
0.449601
```

```
FindMaximum[1 * (m + amp * Sin[B p]) /. sdpSineLine, p][[1]] /
 FindMaximum[1 * (m + amp * Sin[B p]) /. regSineLine, p][[1]]
```

```
0.449601
```