Change in soil quality and the cumulative soil quality for a set sequence

```
In[ ]:= setseq = {1, 1, 1, -1, 1, -1, 1, 1, -1, 1, -1, -1, -1,
          1, -1, -1, -1, 1, -1, 1, -1, 1, -1, -1, 1, -1, -1, 1, 1, 1, -1,
          -1, -1, 1, 1, 1, 1, 1, -1, -1, -1, 1, 1, 1, 1, 1, -1, -1, 1, -1};

In[ ]:= seq = setseq;
        accsoil = Accumulate[seq];

In[ ]:= gold = RGBColor["#FFD700"];
        {covercol, cashcol} = ColorData[97, "ColorList"][[{1, 2}]](*{Purple,gold}*);
        ArrayPlot[{seq}, ColorRules → {1 → covercol, -1 → cashcol},
         Mesh → True, MeshStyle → Directive[Black, Thickness[0.001]]]
```

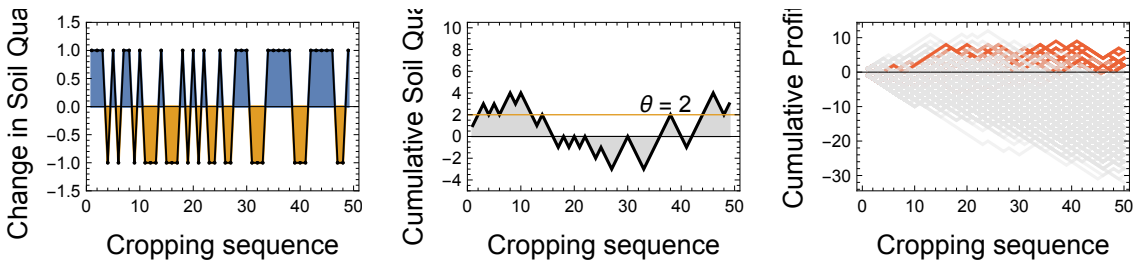
Out[ ]=

```
In[ ]:= ColorData[97, "ColorList"][[{1, 2}]]
```

Out[ ]= {■, ■}

```
In[ ]:= GraphicsRow[
         {ListPlot[seq[[1 ;; Length[seq] - 1]], PlotRange → {{0, 51}, {-1.5, 1.5}},
           Frame → True, Joined → True, FrameStyle → {Black, Thickness[0.002]},
           AxesOrigin → {1, 0}, PlotStyle → Directive[Black, Thickness[0.007]],
           FrameLabel → {Style["Cropping sequence", 14, Black],
             Style["Change in Soil Quality", 14, Black]},
           Mesh → Full, Filling → {1 → {Axis, {cashcol, covercol}}}],
          ListPlot[accsoil[[1 ;; Length[seq] - 1]],
           PlotRange → {{0, 51}, {-5, 10.5}}, PlotStyle → Black, Frame → True,
           Joined → True, FrameStyle → {Black, Thickness[0.001]},
           FrameLabel → {Style["Cropping sequence", 14, Black],
             Style["Cumulative Soil Quality", 14, Black]},
           Filling → {1 → {Axis, LightGray}}, GridLines → {None, {2}},
           GridLinesStyle → Directive[cashcol, Thickness[0.005]],
           Method → {"GridLinesInFront" → True},
           Epilog → Inset[Style["θ = 2", 12], {37, 3}]], profits}, ImageSize → Full]
```

Out[ ]=



Simulating trajectories for cumulative profit

In[ ]:=
```
numberofsimulations = 1000;

p = 0.2;
p1 = 0.5;
p2 = 0.9;
profit = seq /. {1 → -1, -1 → 1};
createtrajectories[maxruns_] := Module[{max = maxruns},
  runs = {};
  For[numerofruns = 1, numerofruns ≤ max, numerofruns++,
   trajectory = {};
   For[i = 1, i ≤ Length[profit], i++,
    If[profit[[i]] == -1, AppendTo[trajectory, If[RandomReal[] < p, 1, -1]]];
    If[profit[[i]] == 1, AppendTo[trajectory, If[accsoil[[i]] > 2,
       If[RandomReal[] < p2, 1, -1], If[RandomReal[] < p1, 1, -1]]]];
   ];
   AppendTo[runs, Accumulate[trajectory]]
  ]
 ]
```

In[ ]:=
```
createtrajectories[numberofsimulations]
```

In[ ]:=
```
won = 0;
If[# > 0, won++] & /@ runs[[All, Length[seq]]];
```

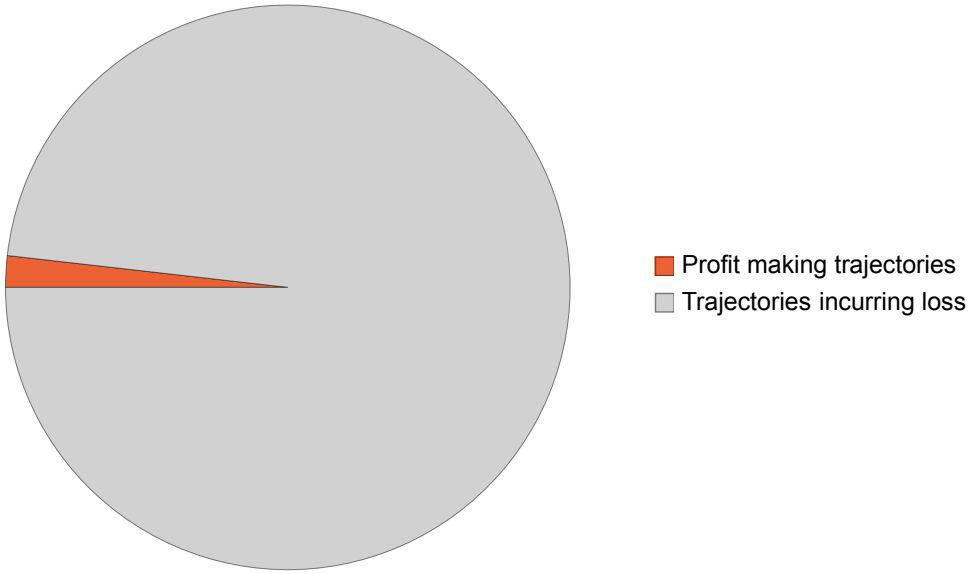
In[ ]:=
```
colorscheme = If[# > 0, ColorData[97, "ColorList"][[{4}]],
     Directive[GrayLevel[0.9], Opacity[0.5]]] & /@ runs[[All, 50]];
profits = ListPlot[runs, Joined → True, PlotStyle → colorscheme,
   Frame → True, FrameStyle → {Black, Thickness[0.002]},
   FrameLabel → {Style["Cropping sequence", 14, Black],
     Style["Cumulative Profit", 14, Black]}];
pie = PieChart[{won / numberofsimulations // N, 1 - won / numberofsimulations // N},
   ChartStyle → Flatten[{ColorData[97, "ColorList"][[{4}]], GrayLevel[0.82]}],
   ChartLegends →
    {"Profit making trajectories", "Trajectories incurring loss"}];
```

In[ ]:=
```
numberofsimulations - won
```

Out[ ]=
```
982
```

In[ ]:= `pie`

Out[ ]=



In[ ]:= `GraphicsRow[{profits, pie}, ImageSize → Full]`