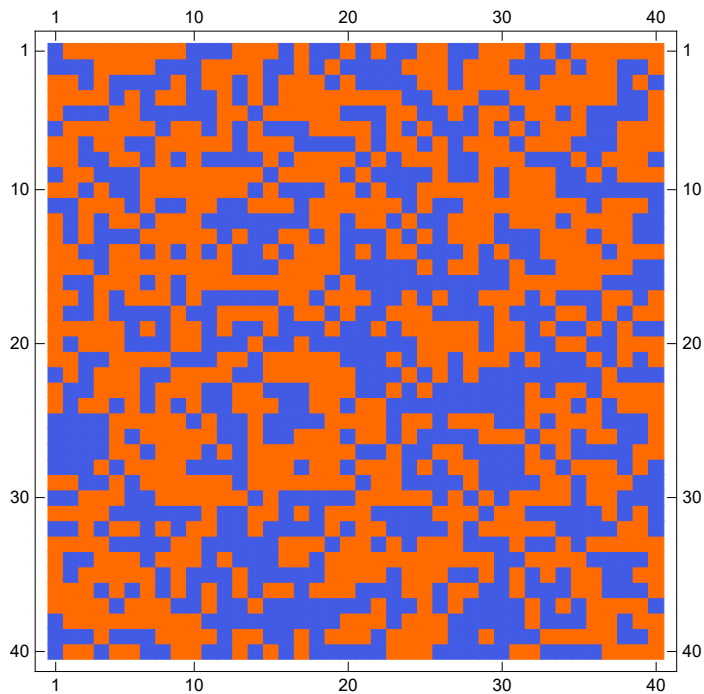


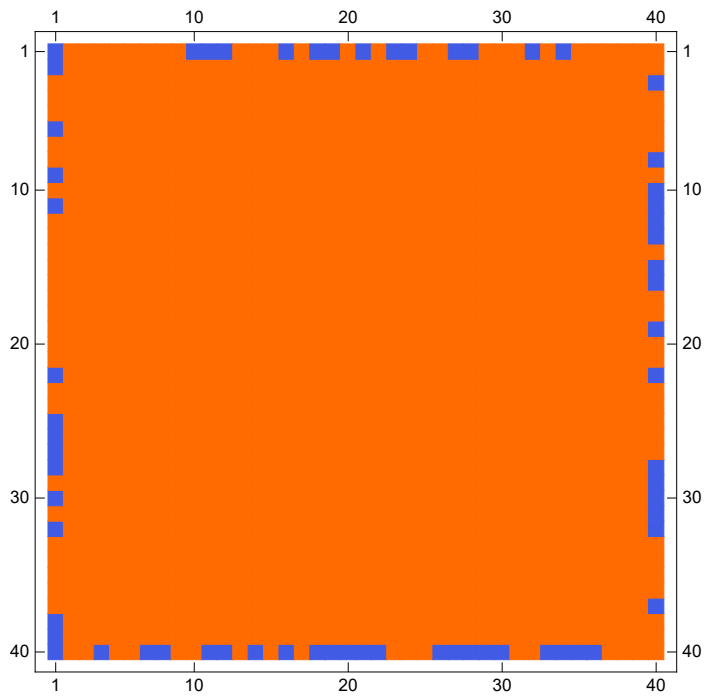
```

(* Site-by-Site Thermalization Metropolis MC *)
(* 2 dim & 40x40 sites & Phase Trans. *)
nd = 40; ns = nd^2; nr = 2^ns; H = 0.0;
sr := 2 (RandomInteger[] - 1/2);
xt := RandomReal[{0, 1}];
Enflip2[m_, n_] := 2 (samp[[m - 1, n]] samp[[m, n]] + samp[[m + 1, n]] samp[[m, n]]
  + samp[[m, n - 1]] samp[[m, n]] + samp[[m, n + 1]] samp[[m, n]] + H samp[[m, n]);

samp = Table[If[xt < 0.55, 1, -1], {nd}, {nd}];
MatrixPlot[samp]
Tt = .5;
Do[Do[If[Enflip2[j, k] ≤ 0, samp[[j, k]] = -samp[[j, k]],
  If[Exp[-Enflip2[j, k]/Tt] > xt, samp[[j, k]] = -samp[[j, k]],
  samp[[j, k]] = samp[[j, k]]], {k, 2, nd - 1}, {j, 2, nd - 1}], {100}];
MatrixPlot[
  samp]

```



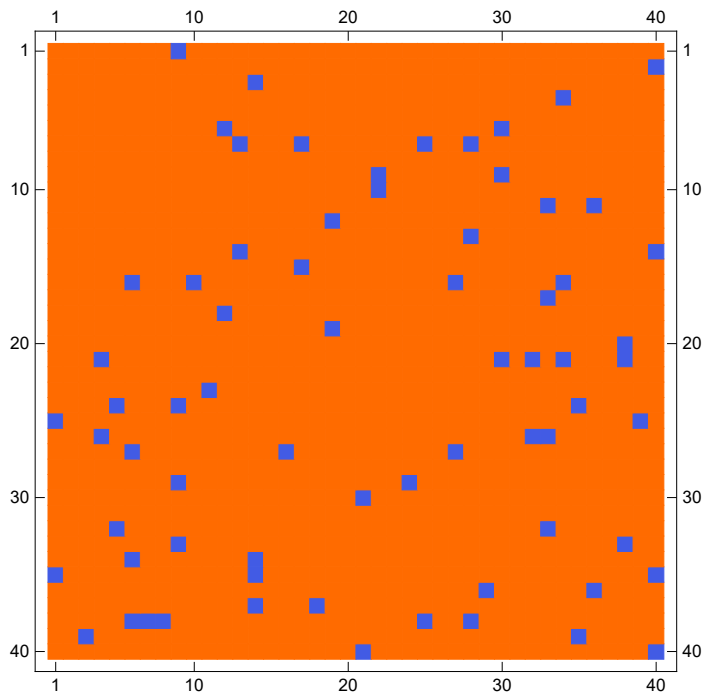


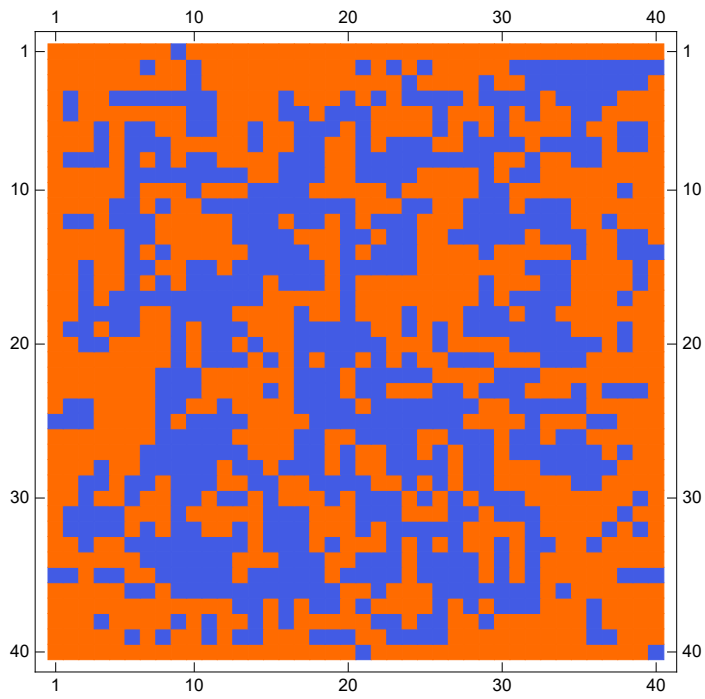
```

(* Site-by-Site Thermalization Metropolis MC *)
(* 2 dim & 40x40 sites & Phase Trans. *)
nd = 40; ns = nd^2; nr = 2^ns; H = 0.0;
sr := 2 (RandomInteger[] - 1/2);
xt := RandomReal[{0, 1}];
Enflip2[m_, n_] := 2 (samp[[m - 1, n]] samp[[m, n]] + samp[[m + 1, n]] samp[[m, n]]
  + samp[[m, n - 1]] samp[[m, n]] + samp[[m, n + 1]] samp[[m, n]] + H samp[[m, n]);

samp = Table[If[xt < 0.95, 1, -1], {nd}, {nd}];
MatrixPlot[samp]
Tt = 4.5;
Do[Do[If[Enflip2[j, k] ≤ 0, samp[[j, k]] = -samp[[j, k]],
  If[Exp[-Enflip2[j, k]/Tt] > xt, samp[[j, k]] = -samp[[j, k]],
  samp[[j, k]] = samp[[j, k]]], {k, 2, nd - 1}, {j, 2, nd - 1}], {100}];
MatrixPlot[
  samp]

```





```

(* Site-by-Site Thermalization Metropolis MC *)
(* 2 dim & 40x40 sites & Phase Trans. *)
nd = 40; ns = nd^2; nr = 2^ns; H = 0.0;
sr := 2 (RandomInteger[] - 1/2);
xt := RandomReal[{0, 1}];
Enflip2[m_, n_] := 2 (samp[[m - 1, n]] samp[[m, n]] + samp[[m + 1, n]] samp[[m, n]]
  + samp[[m, n - 1]] samp[[m, n]] + samp[[m, n + 1]] samp[[m, n]] + H samp[[m, n]);
M = 10;
DateList[]
mag2d = Table[
  M2tab = Table[samp = Table[If[xt < 0.60, 1, -1], {nd}, {nd}];
  Do[Do[If[Enflip2[j, k] ≤ 0, samp[[j, k]] = -samp[[j, k]],
    If[Exp[-Enflip2[j, k]/T] > xt, samp[[j, k]] = -samp[[j, k]],
    samp[[j, k]] = samp[[j, k]]], {k, 2, nd - 1}, {j, 2, nd - 1}], {100}];
  Total[Flatten[samp]], {M}];
{T, Mean[M2tab]/ns // N}, {T, {0.1, 0.4, 0.8, 1.2,
  1.6, 1.8, 2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 3, 3.2, 3.5, 3.7, 4}}]
Show[ListPlot[mag2d, PlotRange → {{0, 4}, {0, 1}}], ListPlot[
  Table[{x, (1 - Sinh[2/x]^(-4))^ (1/8)}, {x, 0.01, 2.27, 0.0001}], PlotStyle → Red]
DateList[]

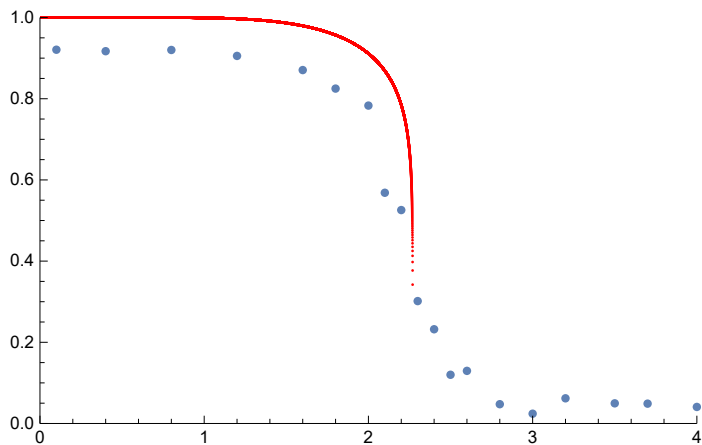
```

```
{2020, 12, 29, 13, 13, 55.0474278}
```

```

{{0.1, 0.92075}, {0.4, 0.917125}, {0.8, 0.920125}, {1.2, 0.9055},
{1.6, 0.870625}, {1.8, 0.825}, {2, 0.783125}, {2.1, 0.568375}, {2.2, 0.52575},
{2.3, 0.3015}, {2.4, 0.232125}, {2.5, 0.12}, {2.6, 0.129625}, {2.8, 0.0475},
{3, 0.024125}, {3.2, 0.062}, {3.5, 0.049625}, {3.7, 0.048875}, {4, 0.04075}}

```



```
{2020, 12, 29, 13, 19, 39.7404805}
```

```

(* Site-by-Site Thermalization Metropolis MC *)
(* 2 dim & 100x100 sites & Phase Trans. *)
nd = 100; ns = nd^2; nr = 2^ns; H = 0.0;
sr := 2 (RandomInteger[] - 1/2);
xt := RandomReal[{0, 1}];
Enflip2[m_, n_] := 2 (samp[[m - 1, n]] samp[[m, n]] + samp[[m + 1, n]] samp[[m, n]]
  + samp[[m, n - 1]] samp[[m, n]] + samp[[m, n + 1]] samp[[m, n]] + H samp[[m, n]);
M = 25;
DateList[]
mag2d = Table[
  M2tab = Table[samp = Table[If[xt < 0.60, 1, -1], {nd}, {nd}];
  Do[Do[If[Enflip2[j, k] ≤ 0, samp[[j, k]] = -samp[[j, k]],
    If[Exp[-Enflip2[j, k]/T] > xt, samp[[j, k]] = -samp[[j, k]],
    samp[[j, k]] = samp[[j, k]]], {k, 2, nd - 1}, {j, 2, nd - 1}], {100}];
  Total[Flatten[samp]], {M}];
{T, Mean[M2tab]/ns // N}, {T, {0.1, 0.4, 0.8, 1.2,
  1.6, 1.8, 2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 3, 3.2, 3.5, 3.7, 4}}]
Show[ListPlot[mag2d, PlotRange → {{0, 4}, {0, 1}}], ListPlot[
  Table[{x, (1 - Sinh[2/x]^(-4))^ (1/8)}, {x, 0.01, 2.27, 0.0001}], PlotStyle → Red]
DateList[]
{2020, 12, 29, 11, 31, 9.2482715}

{{0.1, 0.968416}, {0.4, 0.968176}, {0.8, 0.966904}, {1.2, 0.961976},
{1.6, 0.93832}, {1.8, 0.906776}, {2, 0.84088}, {2.1, 0.786448}, {2.2, 0.616408},
{2.3, 0.398408}, {2.4, 0.131352}, {2.5, 0.051448}, {2.6, 0.0348}, {2.8, 0.03756},
{3, 0.025416}, {3.2, 0.027008}, {3.5, 0.017968}, {3.7, 0.013224}, {4, 0.011392}}

```

```

{2020, 12, 29, 13, 10, 4.7767676}

```