```
In[89]:= (* MA39110 / Assignment 11 / 16MA20053 / NER ROHIT *)
      ClearAll["Global`*"];
In[90]:= cnt = 0; max = 0;
      Model[n0_, r0_] := Module[n = n0, r = r0],
          x0 = 0; xf = 1; h = (xf - x0) / n;
          X = Table[x0 + x * h, {x, 1, n - 1}];
          XT = Table[x0 + x * h, {x, 0, n}];
          f[x_] = Sin[Pi * x];
          U = Table[f[XT[[x]]], {x, 1, n + 1}];
          UT = U;
          UTT = UT;
          PLT = Table[0, {x, 1, 100}];
          For [j = 1, j \le 100, j++, {
            U = UT;
            For [i = 1, i < n, i++,
               im = i + 1;
               If[j \neq 1, UT[[im]] = r * U[[im-1]] + 2(1-r)U[[im]] + r * U[[im+1]] - UTT[[im]],
                UT[[im]] = (1/2) (r * U[[im - 1]] + 2 (1 - r) U[[im]] + r * U[[im + 1]])];
              }];
            UTT = UT;
             PLT[[j]] = ListLinePlot[Transpose[{XT, UT}], PlotRange → {0, 1}];
           }];
          Show[{PLT[[1;;;;10]]},
           PlotLabel → Style[StringForm["h = ``, k = ``", h, h * Sqrt[r]], FontSize → 10]]
         ];
In[92]= GraphicsGrid[{{Model[10, 0.5], Model[10, 0.1]}}, {Model[20, 0.5], Model[20, 0.1]}}]
             h = \frac{1}{10}, k = 0.0707107
                                            h = \frac{1}{10}, k = 0.0316228
      1.0 [
                                      1.0
      0.8
                                      8.0
      0.6
                                      0.6
      0.4
                                      0.4
                                      0.2
      0.2
       0.0
                                       0.0
Out[92]=
             h = \frac{1}{20}, k = 0.0353553
                                            h = \frac{1}{20}, k = 0.0158114
      1.0 [
                                      1.0 [
      0.8
                                      8.0
                                     0.6
      0.6
      0.4
                                      0.4
```

0.2

0.0

0.2

0.4

0.6

8.0

0.2

0.0

0.2

0.4

0.6

0.8