Bogdan Chwaliæski

Zestaw 6 zdanie 5

In[91]:=
```
HalleyMethodList[f_, {x_, x0_}, n_] :=
 NestList[# - (2 * Function[x, f][#] * Derivative[1][Function[x, f]][#]) /
      (2 * (Derivative[1][Function[x, f]][#])^2 -
        Function[x, f][#] * Derivative[2][Function[x, f]][#]) &, x0, n]
```

In[107]:=
```
HalleyMethodList[x^3 + 3 x^2 - 5 x + 3, {x, 1.0}, 20]
```

Out[107]=
```
{1., -1., 0.25, 2.02329, 0.999947, -1.00128, 0.249249, 2.01215,
 0.994106, -1.15432, 0.15398, 1.29918, 0.474152, -0.0421108,
 0.880316, 2.7311, 1.34327, 0.527958, 0.268946, 2.37768, 1.17674}
```

In[115]:=
```
HalleyIteration[f_, z_] := z - 2 * Function[z, f][z] /
     (Derivative[1][Function[z, f]][z]
       - Sqrt[(Derivative[1][Function[z, f]][z])^2 -
          2 * Function[z, f][z] * Derivative[2][Function[z, f]][z]]
     )
```

In[116]:=
```
FullSimplify[HalleyIteration[z^3 + 3 z^2 - 5 z + 3, z]]
```

Out[116]=
$$\frac{5 + 3\,z^2 - \sqrt{-11 - 3\,z\,(6 + z)\,(2 + (-2 + z)\,z)}}{6\,(1 + z)}$$

In[117]:=
```
hally = Compile[{{z, _Complex}},
   Length[FixedPointList[(5 + 3 #^2 - Sqrt[-11 - 3 # (6 + #) (2 + (-2 + #) #)])/
      (6 (1 + #)) &, z, 100]]];
```

Graficzne przedstawienie na p□aszczy□nie zespolonej.

In[118]:=
```
ListDensityPlot[Table[hally[x + I y], {x, -10, 10, 0.1}, {y, -8, 8, 0.1}],
  Mesh → False,
  ColorFunction → (Hue[2 #] &),
  Frame → False] // Timing
```