$f(x) = x^2 - 3x + 7$

$x_0 = 7$

a) $x^2 - 3x + 7 = 0$

$x^2 + 7 = 3x$

$\rightarrow \varphi(x) = \frac{x^2+7}{3}$

$x_{n+1} = \frac{x_n^2 + 7}{3}$

$x_0 = 7$

$x_1 = \frac{7^2+7}{3} = \frac{2}{3}$

$x_2 = \frac{\left(\frac{2}{3}\right)^2 + 7}{3} = \frac{\frac{4}{9} + 7}{3} = \frac{13}{9 \cdot 3} = \frac{13}{27}$

$\varphi'(x) = \frac{2x}{3}$

$\varphi'(7) = \frac{2}{3} < 7$ - měla by konvergovat

b) $x^2 - 3x + 7 = 0$

$x^2 = 3x - 7$

$x = \sqrt{3x-7}$

$\varphi(x) = \sqrt{3x-7}$

$x_{n+1} = \sqrt{3x_n - 7}$

$x_0 = 7$

$x_1 = \sqrt{3 \cdot 7 - 7} = \sqrt{2}$

$x_2 = \sqrt{3 \cdot \sqrt{2}} \approx 2,06$

$\varphi'(x) = \frac{3}{2\sqrt{3x-7}}$

$\varphi'(7) = \frac{3}{2\sqrt{2}} \approx 1,06$

$\varphi'(7) > 7$ - neměla by konvergovat