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3.5.1 Finger Exercise: Convergence of Newton's method and impact of initial guess

Finger Exercises 3 due Aug 17, 2023 05:00 IST Completed

Problem: Convergence of Newton's method

1/1 point (graded)

MO2.10

You can find an approximation to $\sqrt{2}$ by running Newton's method to find the root of the function $r(x) = x^2 - 2$. Initialize the iteration with $x^0 = 1$. What value x do you obtain after two iterations of Newton's method (i.e. $k = 2$)? Enter the value to four decimal places (1.WXYZ).

1.4167 ✔ Answer: 1.4167

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Answers are displayed within the problem

Problem: A different initial guess

1/1 point (graded)

Now suppose that you choose $x^0 = -1$. What happens?

- Convergence to $\sqrt{2}$
- Convergence to $-\sqrt{2}$ ✔
- Divergence (i.e. no convergence)
- Error, division by zero

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Problem: And another initial guess

1/1 point (graded)

Now suppose that you choose $x^0 = 0$. What happens?

- Convergence to $\sqrt{2}$
- Convergence to $-\sqrt{2}$
- Divergence (i.e. no convergence)
- Error, division by zero ✔

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