

Lineer Olmayan Denklemlerin Çözümü:

Sorularda eğer belirtilmediyse durdurma kriteri olarak bağıl hatayı kullanın.

Bisection Metodu:

- Use the Bisection method to find p_3 for $f(x) = \sqrt{x} - \cos x$ on $[0, 1]$.
- Let $f(x) = 3(x+1)(x - \frac{1}{2})(x-1)$. Use the Bisection method on the following intervals to find p_3 .
 - $[-2, 1.5]$
 - $[-1.25, 2.5]$
- Use the Bisection method to find solutions accurate to within 10^{-2} for $x^3 - 7x^2 + 14x - 6 = 0$ on each interval.
 - $[0, 1]$
 - $[1, 3.2]$
 - $[3.2, 4]$
- Use the Bisection method to find solutions accurate to within 10^{-2} for $x^4 - 2x^3 - 4x^2 + 4x + 4 = 0$ on each interval.
 - $[-2, -1]$
 - $[0, 2]$
 - $[2, 3]$
 - $[-1, 0]$
- Use the Bisection method to find solutions accurate to within 10^{-5} for the following problems.
 - $x - 2^{-x} = 0$ for $0 \leq x \leq 1$
 - $e^x - x^2 + 3x - 2 = 0$ for $0 \leq x \leq 1$
 - $2x \cos(2x) - (x+1)^2 = 0$ for $-3 \leq x \leq -2$ and $-1 \leq x \leq 0$
 - $x \cos x - 2x^2 + 3x - 1 = 0$ for $0.2 \leq x \leq 0.3$ and $1.2 \leq x \leq 1.3$
- Use the Bisection method to find solutions, accurate to within 10^{-5} for the following problems.
 - $3x - e^x = 0$ for $1 \leq x \leq 2$
 - $2x + 3 \cos x - e^x = 0$ for $0 \leq x \leq 1$
 - $x^2 - 4x + 4 - \ln x = 0$ for $1 \leq x \leq 2$ and $2 \leq x \leq 4$
 - $x + 1 - 2 \sin \pi x = 0$ for $0 \leq x \leq 0.5$ and $0.5 \leq x \leq 1$
- Sketch the graphs of $y = x$ and $y = 2 \sin x$.
 - Use the Bisection method to find an approximation to within 10^{-5} to the first positive value of x with $x = 2 \sin x$.
- Sketch the graphs of $y = x$ and $y = \tan x$.
 - Use the Bisection method to find an approximation to within 10^{-5} to the first positive value of x with $x = \tan x$.
- Sketch the graphs of $y = e^x - 2$ and $y = \cos(e^x - 2)$.
 - Use the Bisection method to find an approximation to within 10^{-5} to a value in $[0.5, 1.5]$ with $e^x - 2 = \cos(e^x - 2)$.

Sabit Nokta iterasyonu Metodu:

11. For each of the following equations, determine an interval $[a, b]$ on which fixed-point iteration will converge. Estimate the number of iterations necessary to obtain approximations accurate to within 10^{-5} , and perform the calculations.
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|----------------------------------|-------------------------------|
| a. $x = \frac{2 - e^x + x^2}{3}$ | b. $x = \frac{5}{x^2} + 2$ |
| c. $x = (e^x/3)^{1/2}$ | d. $x = 5^{-x}$ |
| e. $x = 6^{-x}$ | f. $x = 0.5(\sin x + \cos x)$ |
12. For each of the following equations, use the given interval or determine an interval $[a, b]$ on which fixed-point iteration will converge. Estimate the number of iterations necessary to obtain approximations accurate to within 10^{-5} , and perform the calculations.
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| a. $2 + \sin x - x = 0$ use $[2, 3]$ | b. $x^3 - 2x - 5 = 0$ use $[2, 3]$ |
| c. $3x^2 - e^x = 0$ | d. $x - \cos x = 0$ |
13. Find all the zeros of $f(x) = x^2 + 10 \cos x$ by using the fixed-point iteration method for an appropriate iteration function g . Find the zeros accurate to within 10^{-4} .

Newton ve Diğer Yöntemler:

- Let $f(x) = x^2 - 6$ and $p_0 = 1$. Use Newton's method to find p_2 .
- Let $f(x) = -x^3 - \cos x$ and $p_0 = -1$. Use Newton's method to find p_2 . Could $p_0 = 0$ be used?
- Let $f(x) = x^2 - 6$. With $p_0 = 3$ and $p_1 = 2$, find p_3 .
 - Use the Secant method.
 - Use the method of False Position.
 - Which of **a.** or **b.** is closer to $\sqrt{6}$?
- Let $f(x) = -x^3 - \cos x$. With $p_0 = -1$ and $p_1 = 0$, find p_3 .
 - Use the Secant method.
 - Use the method of False Position.
- Use Newton's method to find solutions accurate to within 10^{-4} for the following problems.

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| a. $x^3 - 2x^2 - 5 = 0$, $[1, 4]$ | b. $x^3 + 3x^2 - 1 = 0$, $[-3, -2]$ |
| c. $x - \cos x = 0$, $[0, \pi/2]$ | d. $x - 0.8 - 0.2 \sin x = 0$, $[0, \pi/2]$ |
- Use Newton's method to find solutions accurate to within 10^{-5} for the following problems.
 - $e^x + 2^{-x} + 2 \cos x - 6 = 0$ for $1 \leq x \leq 2$
 - $\ln(x - 1) + \cos(x - 1) = 0$ for $1.3 \leq x \leq 2$
 - $2x \cos 2x - (x - 2)^2 = 0$ for $2 \leq x \leq 3$ and $3 \leq x \leq 4$
 - $(x - 2)^2 - \ln x = 0$ for $1 \leq x \leq 2$ and $e \leq x \leq 4$
 - $e^x - 3x^2 = 0$ for $0 \leq x \leq 1$ and $3 \leq x \leq 5$
 - $\sin x - e^{-x} = 0$ for $0 \leq x \leq 1$, $3 \leq x \leq 4$ and $6 \leq x \leq 7$
- Repeat Exercise 5 using the Secant method.
- Repeat Exercise 6 using the Secant method.
- Repeat Exercise 5 using the method of False Position.
- Repeat Exercise 6 using the method of False Position.
- Use all three methods in this Section to find solutions to within 10^{-5} for the following problems.
 - $3xe^x = 0$ for $1 \leq x \leq 2$
 - $2x + 3 \cos x - e^x = 0$ for $0 \leq x \leq 1$