pr4_ii_math548_midterm_Lazizbek

March 19, 2024

1 Math 548, Midterm. Problem 4. LS

Problem 4

(ii)

(iii) Now, use the iteration method given below to find the root of

( ) = ^ − 2 cos( ) = 0 in the interval [0,2].

Choose your starting values as x0 = 0.6 and y0 = 0.3388.

yn+1 = yn (2 – f'(xn) yn)

xn+1 = xn – yn+1 f(xn)

(e) Compare your methods and results in (i) and (ii) and discuss any connections between (i) and (ii).

#Problem 4. (ii)

[ ]:
```
# Determine this solution using the Newton's method with a tolerance  as␣
 ↪10^(-6)
import numpy as np
import math


M = 6 # in case the program goes into infinite loops
epsilon = 10**(-8)

# f(x) = math.exp(x) - 2*math.cos(x)
x0 = 0.6
y0 = 0.3388
for i in range(1, M):
  y1 = y0*(2 - (math.exp(x0) + 2*math.sin(x0))*y0)
  x1 = x0 - y1*(math.exp(x0) - 2*math.cos(x0))

  v = math.exp(x1) - 2*math.cos(x1)
  print(i, "\t ", x1, "\t", v)
  if abs(v) < epsilon:
    break
  y0 = y1
```

```
  x0 = x1
```

```
1          0.5419098217166501      0.005836841512263824
2          0.5397977761841749      3.461107957947185e-05
3          0.5397851615702651      2.087791273197581e-09
```

[ ]:
```
# !sudo apt-get install texlive-xetex texlive-fonts-recommended␣
↪texlive-plain-generic
```

[ ]:
```
# !jupyter nbconvert --to pdf /content/Math548_hw6_Lazizbek.ipynb
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