Assignment-4: Fourier Approximations

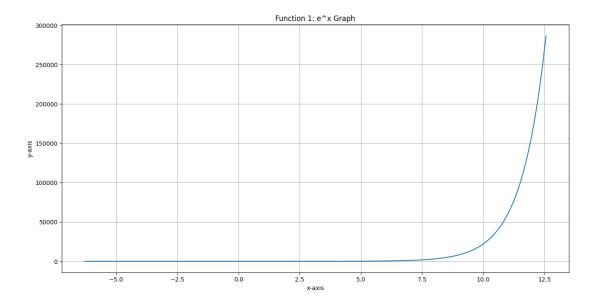
Syam SriBalaji T

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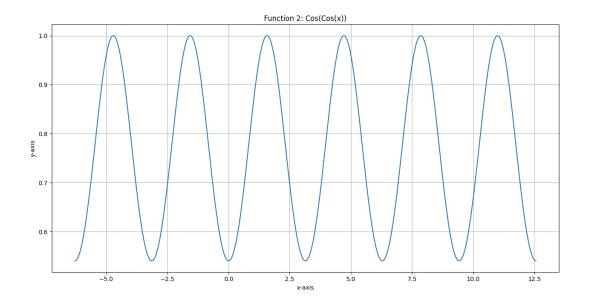
February 25, 2022

EE2703 :Jan-May 2022

 e^x graph in range of $(-2\pi, 4\pi)$

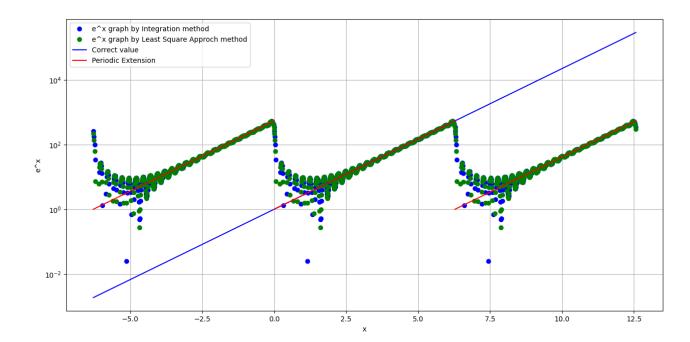


 $\cos(\cos(\mathbf{x}))$ graph in range of $(-2\pi, 4\pi)$



As we see the graph, we can clearly notice that e^x function is not periodic whereas $\cos(\cos(x))$ function is periodic with Time period= π .

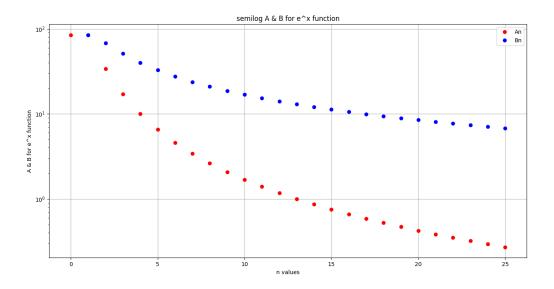
e^x Approximation graph by Least Square Approch method and Integrate method:



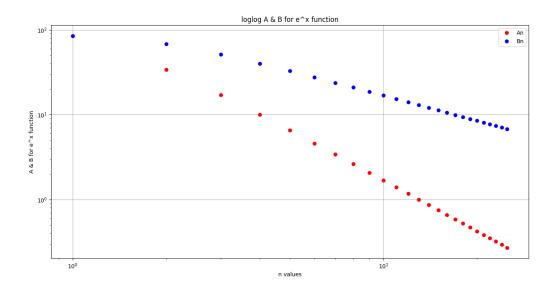
Question:6

Maximum deviation of coefficients in e^x function is 1.775420e+00 Maximum deviation of coefficients in $\cos(\cos(x))$ function is 2.643332e-15

A and B for e^x function for Integration method in semilog graph.

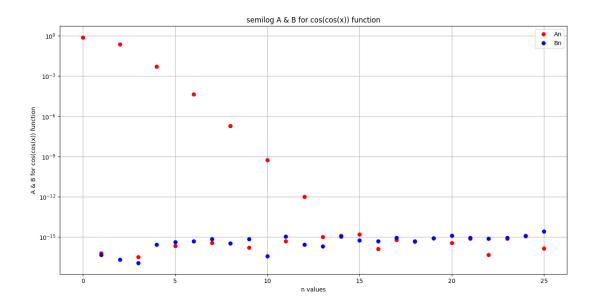


A and B for e^x function for Integration method in loglog graph.

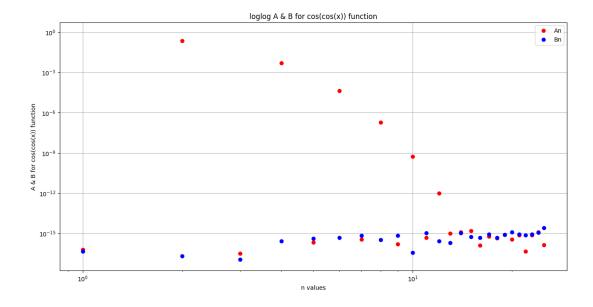


Inference: For e^x function, both A and B coefficients decreases over n values, while magnitude of slope of A is more than of B.

A and B for cos(cos(x)) function for Integration method in semilog graph.



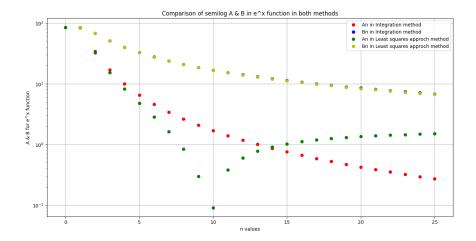
A and B for cos(cos(x)) function for Integration method in loglog graph.



Inference: For $\cos(\cos())$ function, A coefficients vary more in the beginning and variation decreases over increase in n values, while B coefficients almost have same values.

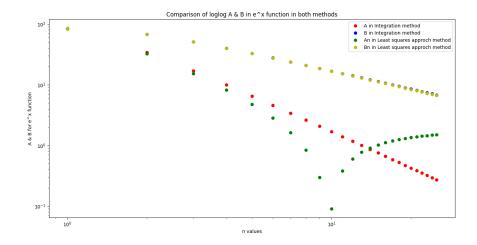
Comparison of semilog graph A & B in e^x function in both methods.

Here we can notice that the A coefficients obtained from both the methods vary more, whereas the B coefficients obtained from both the methods coincide each other without varying.



Comparison of loglog graph A & B in e^x function in both methods.

Here too we can notice the same pattern in above, Where A coefficients vary more and B coefficients coincide.

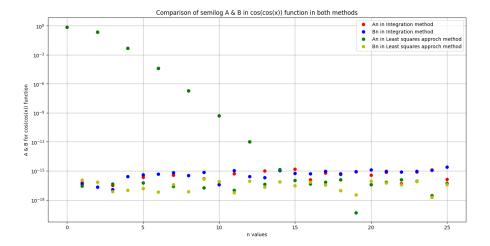


Inference: Thus for e^x function, A varies more from both methods whereas B coincides.

Comparison of semilog A & B in cos(cos(x)) function in both methods.

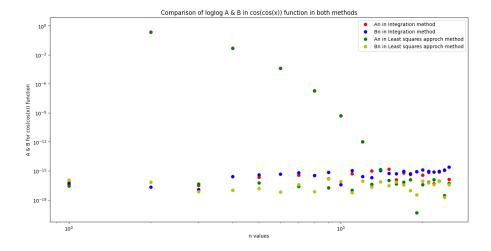
Here we can notice that the A coefficients obtained from both the methods vary more in the beginning (Least squares approch method's A coefficient values are more than Integration method's A coefficient values) and variation decreases as n values increases.

Here B coefficients varies less (but doesn't coincide like in e^x function).



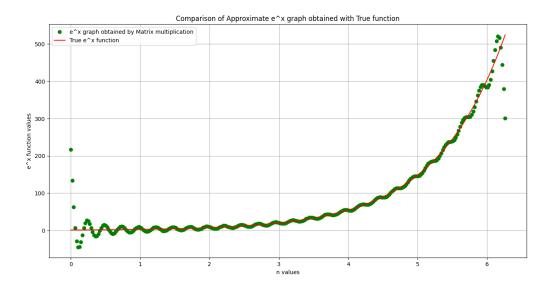
Comparison of semilog A & B in cos(cos(x)) function in both methods.

Here too we can notice the same pattern as above, Where A coefficients vary more in beginning and then variation decrease as n value increases and B coefficients varies less.

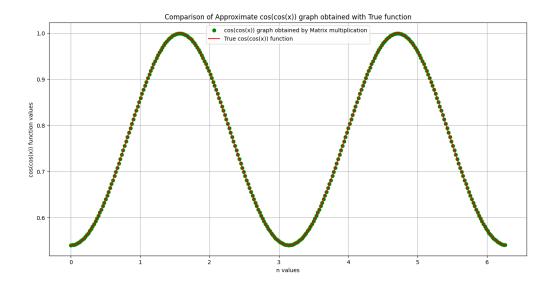


Inference: Thus for $\cos(\cos(x))$ function, A varies more in beginning and then variation decreases whereas B varies less throughout.

Comparison of Approximate e^x graph optained with True function.



Comparison of Approximate cos(cos(x)) graph optained with True function.



Thank you!