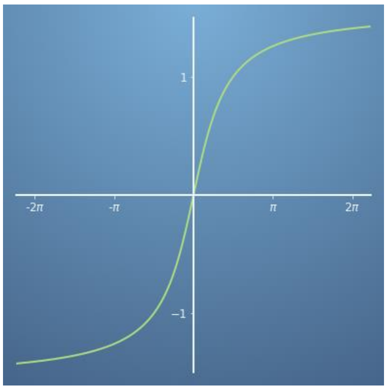
Taylor series - Special cases

TOTAL POINTS 5

1.Question 1

The graph below shows the function f(x) = tan^-1(x)



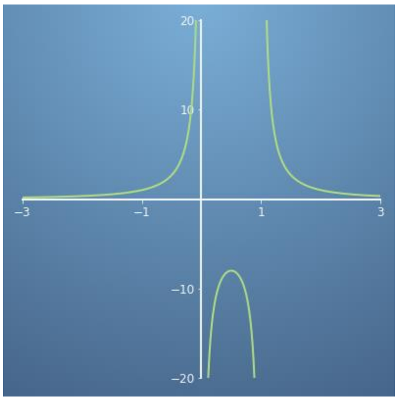
By using the Maclaurin series or otherwise, determine whether the function shown above is even, odd or neither.

1 / 1 point

- (•) Odd
- ( ) Even
- ( ) Neither odd nor even

2.Question 2

The graph below shows the discontinuous function f(x) = 2 / (x^2 - x). For this function, select the starting points that will allow a Taylor approximation to be made.

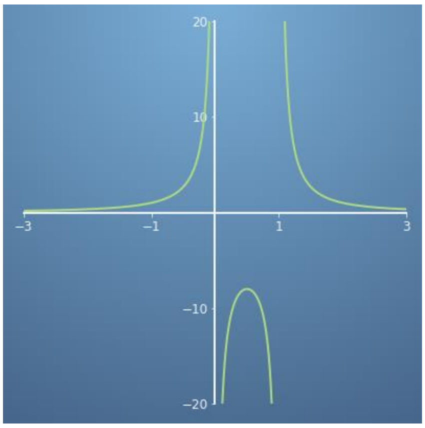


1 / 1 point

- [x] x = 0.5
- [x] x = -3
- [ ] x = 1
- [x] x = 2

3.Question 3

For the same function as previously discussed, $f(x) = \frac{2}{(x^2 - x)}$ $f(x)=(x2-x)2$, select all of the statements that are true about the resulting Taylor approximation.

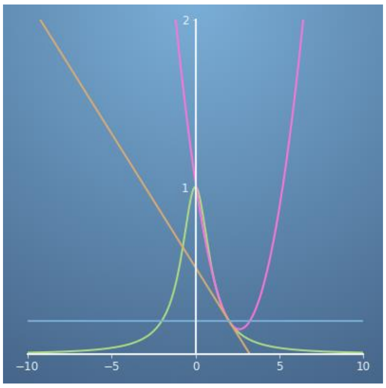


1 / 1 point

- [x] Approximation ignores segments of the function
- [x] Approximation ignores the asymptotes
- [ ] The approximation converges quickly
- [ ] Approximation accurately captures the asymptotes
- [ ] This is a well behaved function

4.Question 4

The graph below highlights the function $f(x) = 1 / (1+x^2)$ (green line), with the Taylor expansions for the first 3 terms also shown about the point $x=2$. The Taylor expansion is $f(x) = 1 / 5 - 4(x-2) / 25 + 11(x-2)^2 / 125 + \ldots$. Although the function looks rather normal, we find that the Taylor series does a bad approximation further from its starting point, not capturing the turning point. What could be the reason why this approximation is poor for the function described.



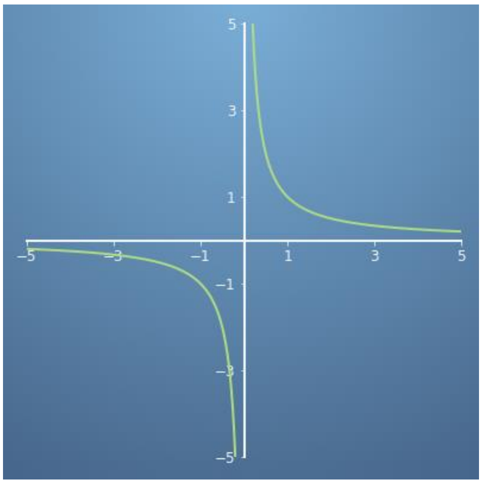
1 / 1 point

- [ ] Function does not differentiate well
- [ ] The function has no real roots

- [x] Asymptotes are in the complex plane
- [x] It is a discontinuous function in the complex plane
- [ ] None of these options

5.Question 5

For the function $f(x) = 1 / x$, provide the linear approximation about the point $x=4$, ensuring it is second order accurate.



1 / 1 point

- ( ) $f(x) = 1/4 - x / 16 + O(\Delta x\text{^}2)$
- (•) $f(x) = 1/4 - (x-4) / 16 + O(\Delta x\text{^}2)$
- ( ) $f(x) = 1/4 + x / 16 - O(\Delta x\text{^}2)$
- ( ) $f(x) = 1/4 - (x-4) / 16 + O(\Delta x)$