ACSAI, Calculus Unit 1 a.a. 2021 /22 - January 21st 2022- Prof. Nadia Ansini B  
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Exercise 1 Using the following Taylor Polynomial expansions at x=0  
cosx=nX  
h=0(1)hx2h  
(2h)!+o(x2n+1);  
sinx=nX  
h=0(1)hx2h+1  
(2h+1)!+o(x2n+2);  
ex=nX  
h=0xh  
h!+o(xn)  
compute the following limit  
lim  
x!0cosx2ex  
sin(x):  
Exercise 2 Solve the following inequalities and write in terms of intervals  
(a) x22x+22x1 ,  
(b)p  
x29x>x4 ,  
(c) (2 x1)j3x+1j.  
(d) Using the properties of the logarithm (and rearranging the terms...) solve the following inequality log 62x<log 2x+1,  
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Exercise 3 Given the function  
f(x)=3p  
3+x1  
1. ﬁnd the domain of f, symmetries and study the sign of f;  
2. ﬁnd the continuity and di erentiability set and precise the type of discontinuities and non-di erentiability points (if  
there exist), asymptotes;  
3. ﬁnd maximum, minimum and ﬂex points (if there exist);  
4. intervals of monotonicity of the function fand the derivative f0, intervals of convexity and concavity;  
5. draw the rough graph.  
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