Extra Questions

Question: Let f(x) = x^5 - 14
(i) Find the zeros of f(x)
(ii) Plot the graph of of f(x) in the interval (-1, 1)
(iii) Find f'(x) and zeros of f'(x)
(iv) Find f''(x) and zeros of f''(x)
(v) Plot combined graph of f(x), f'(x) and f'''(x)
(vi) Find the fractors of f(x)

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(%i1) f(x):=x^5-14;
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$$(\%o1)\quad f(x):=x^5-14$$

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(%i2) solve(f(x)=0,x);
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$$(\%o2)\quad [x=14^{\frac{1}{5}}\ \%e^{\frac{2\%i\pi}{5}},x=14^{\frac{1}{5}}\ \%e^{\frac{4\%i\pi}{5}},x=14^{\frac{1}{5}}\ \%e^{-\frac{4\%i\pi}{5}},x=14^{\frac{1}{5}}\ \%e^{-\frac{2\%i\pi}{5}},x=14^{\frac{1}{5}}]$$

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(%i3) wxplot2d(f(x),[x,-1,1]);
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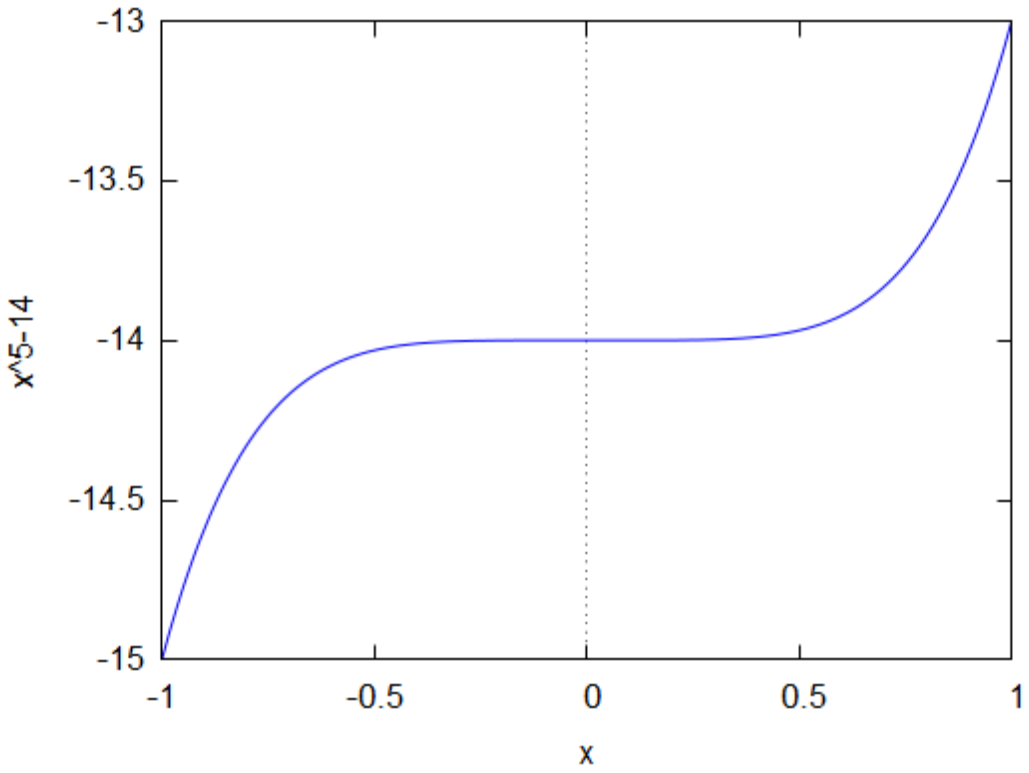
$$(\%t3)$$



$$(\%o3)$$

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(%i4) df(x):=diff(f(x),x);
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$$(\%o4)\quad df(x):=\frac{d}{dx}f(x)$$

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(%i5) df(x);
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$$(\%o5)\quad 5x^4$$

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(%i6) allroots(df(x)=0);
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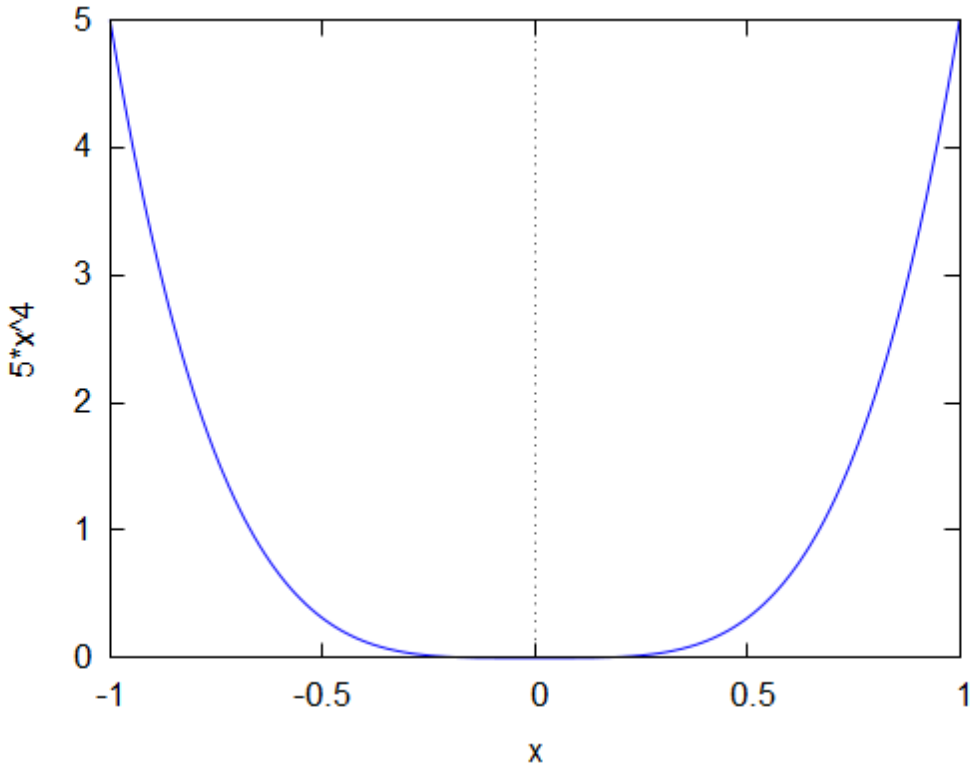
(%o6) $[x = 0.0, x = 0.0, x = 0.0, x = 0.0]$

(%i7) wxplot2d (df (x) , [x , − 1 , 1]) ;

(%t7)



(%o7)

(%i8) d2f (x) : = diff (df (x) , x) ;

(%o8) $\mathrm{d2f}(x) := \frac{d}{dx}\mathrm{df}(x)$

(%i9) d2f (x) ;

(%o9) $20x^3$

(%i10) %o19 , x = 2 ;

(%o10) *%o19*

(%i11) A : 12 ;

(%o11) 12

(%i12) A ;

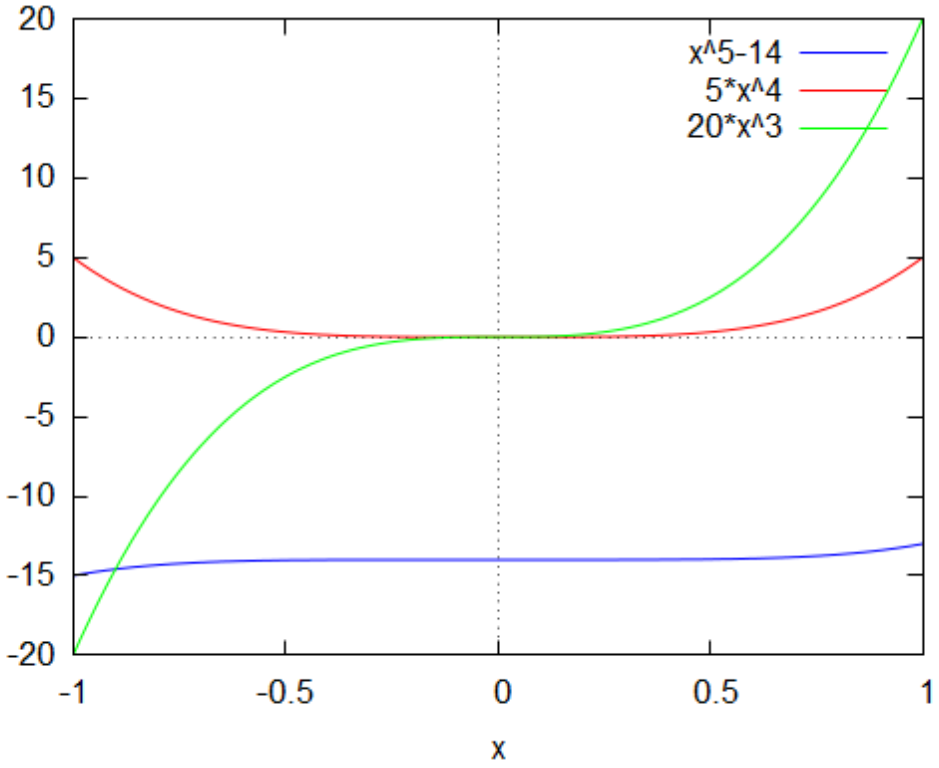
(%o12) 12

(%i13) allroots (d2f (x) = 0) ;

(%o13) $[x = 0.0, x = 0.0, x = 0.0]$

(%i14) wxplot2d ([f (x) , df (x) , d2f (x)] , [x , − 1 , 1]) ;

(%t14)



(%o14)

(%i15) factorC (x ^ 5 − 14) ;

(%o15) $\text{factorC}\left(x^5 - 14\right)$

Question: Let f(x) = log(x) - 1
(i) Find the zeros of f(x)
(ii) Plot the graph of of f(x) in the interval (0.3, 5)
(iii) Find f'(x)
(iv) Find f''(x)
(v) Plot combined graph of f(x), f'(x) and f'''(x)

(%i16) f (x) : = log (x) − 1 ;

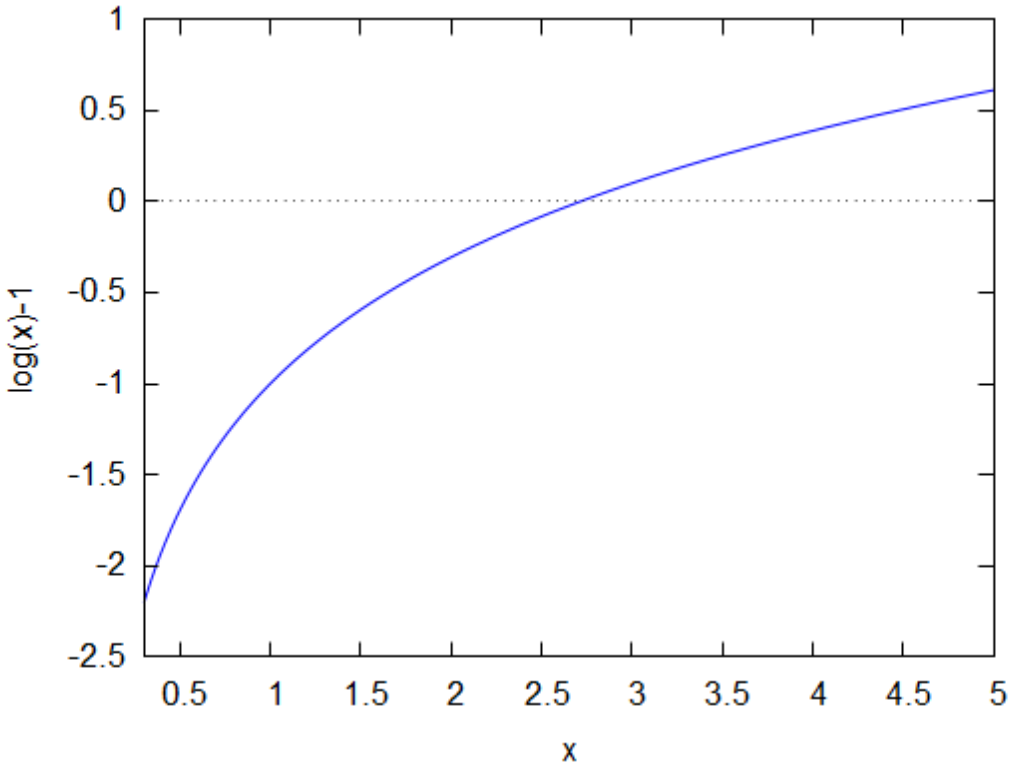
(%o16) $f(x) := \log(x) - 1$

(%i17) solve (f (x) = 0 , x) ;

(%o17) $[x = \%e]$

(%i18) wxplot2d (f (x) , [x , 0 . 3 , 5]) ;

(%t18)



(%o18)

(%i19) df (x) : = diff (f (x) , x) ;

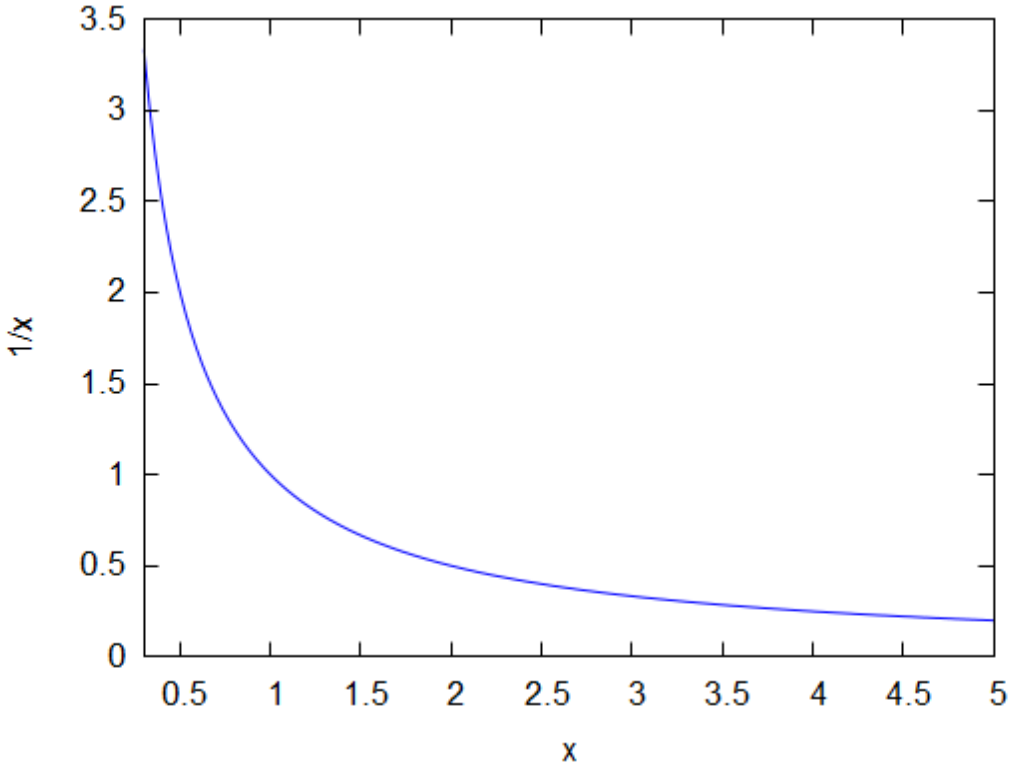
(%o19) $\mathrm{df}(x) := \frac{d}{dx}\mathrm{f}(x)$

(%i20) df (x) ;

(%o20) $\frac{1}{x}$

(%i21) wxplot2d (df (x) , [x , 0 . 3 , 5]) ;

(%t21)



(%o21)

(%i22) d2f (x) : = diff (df (x) , x) ;

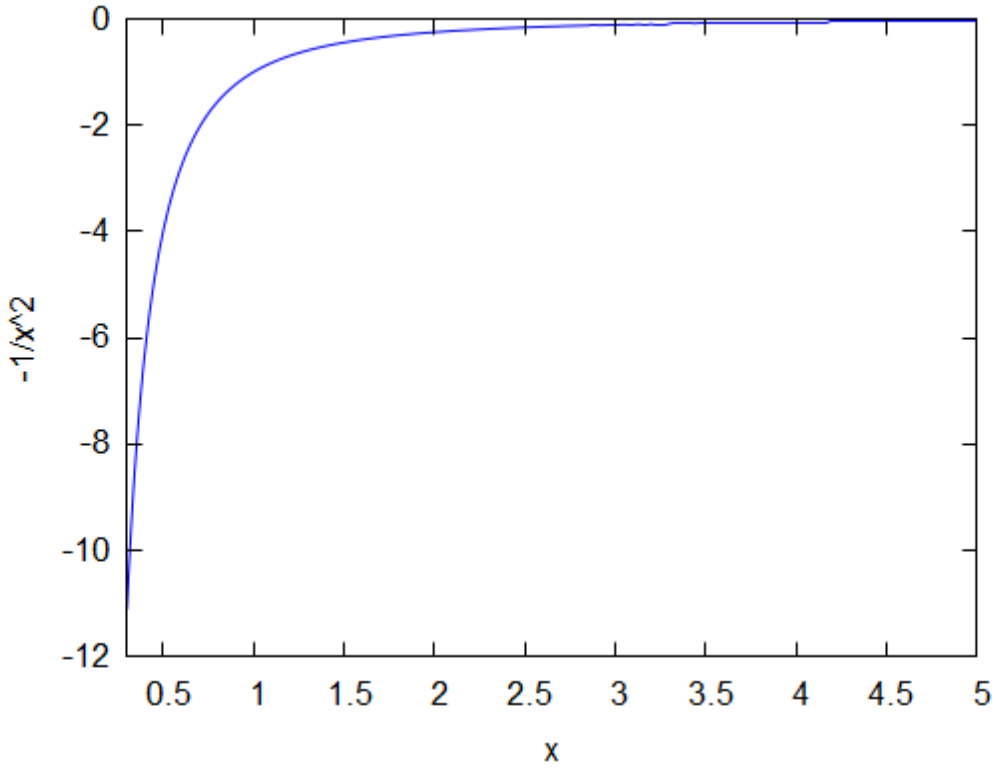
(%o22) $\mathrm{d2f}(x) := \frac{d}{dx}\mathrm{df}(x)$

(%i23) d2f (x) ;

(%o23) $-\frac{1}{x^2}$

(%i24) wxplot2d (d2f (x) , [x , 0 . 3 , 5]) ;

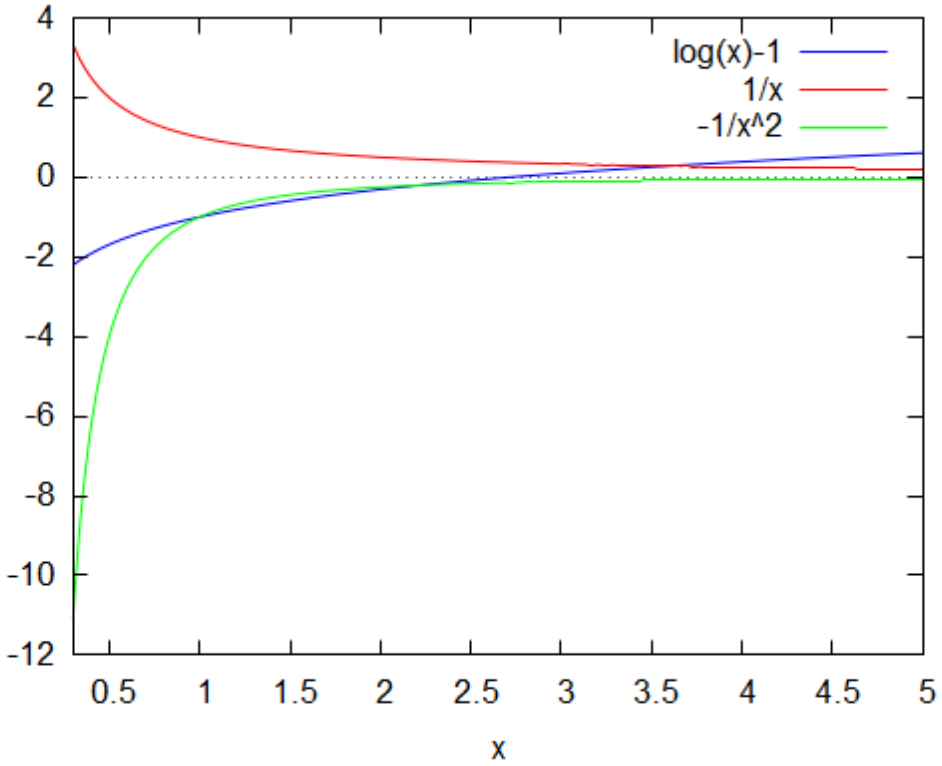
(%t24)



(%o24)

(%i25) wxplot2d ([f (x) , df (x) , d2f (x)] , [x , 0 . 3 , 5]) ;

(%t25)



(%o25)
