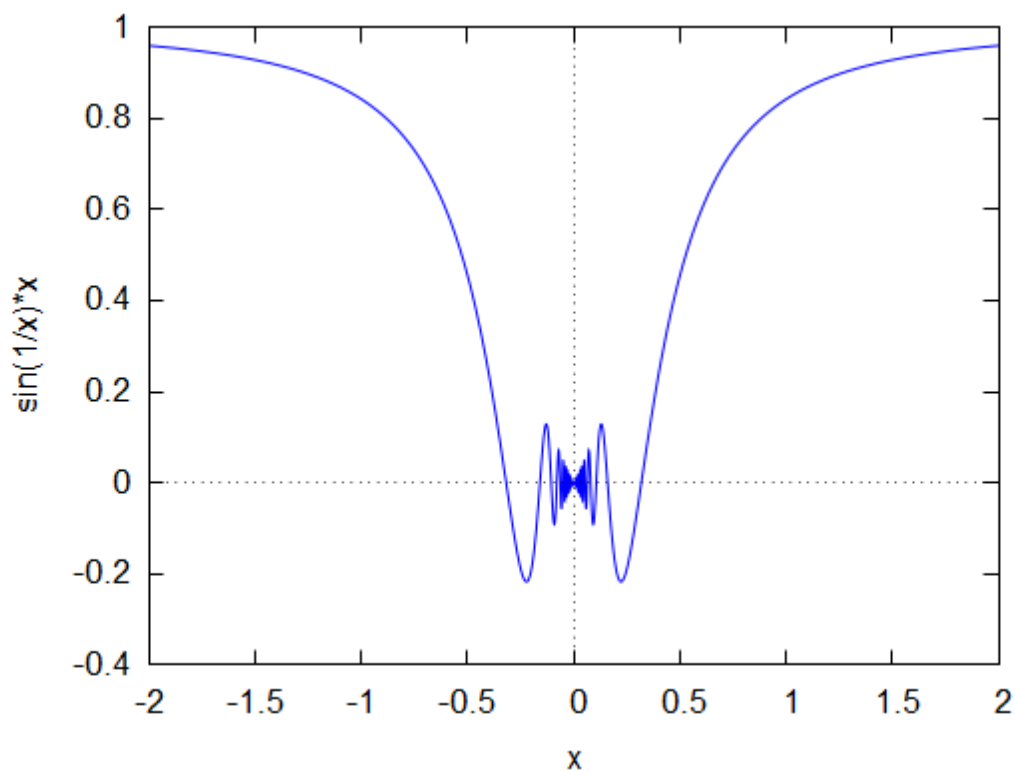Q Write the Command for plotting the graph of y = xsin(1/x) and Z = xy/(x² + y²)

(%i1) wxplot2d (x · sin (1 / x) , [x , − 2 , 2]) ;

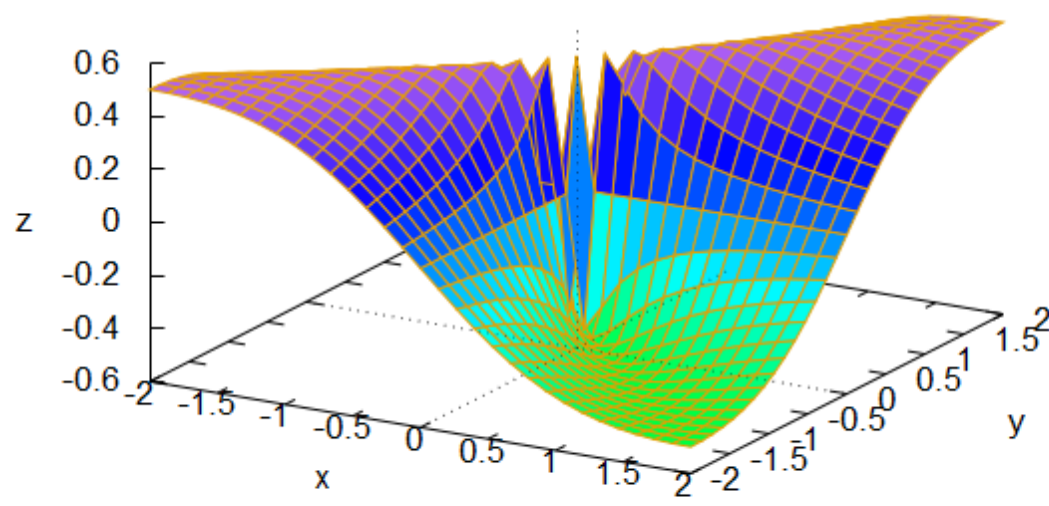*plot2d : expressionevaluatestonon − numericvaluesomewhereinplottingrange.*

(%t1)

(%o1)

(%i2) wxplot3d (x · y / (x ^ 2 + y ^ 2) , [x , − 2 , 2] , [y , − 2 , 2]) ;

(%t2)

(%o2)

Q Write Command for
1. Scaler matrix of order 4 with fixed entry -2
2. identity matrix of order 4
3. digonal matrix [[1, 0, 0],
[0, 2, 0],
[0, 0, 1]]
4. for adding column [[5],
[6]]
in the matrix A = [[0, 2],
[3, 5]]
also give sytax for adding row [[5, 6]].
Also write for charactarstic polynomial for A and inverse of A.
5. eigen values and eigen vectors of matrix A
6. limit of g(x) at x = c
7. integrating f(x) = 1 + x^2 within the limits 0 to 10

(%i3) diagmatrix (4 , − 2) ;

(%o3)
$$\begin{pmatrix} -2 & 0 & 0 & 0 \\ 0 & -2 & 0 & 0 \\ 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & -2 \end{pmatrix}$$

(%i4) ident (4) ;

(%o4)
$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%i5) diag_matrix (1 , 2 , 1) ;

(%o5)
$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

(%i6) A : matrix ([0 , 2] , [3 , 5]) ;

(%o6)
$$\begin{pmatrix} 0 & 2 \\ 3 & 5 \end{pmatrix}$$

(%i7) addcol (A , [5 , 6]) ;

(%o7)
$$\begin{pmatrix} 0 & 2 & 5 \\ 3 & 5 & 6 \end{pmatrix}$$

(%i8) addrow (A , [5 , 6]) ;

(%o8)
$$\begin{pmatrix} 0 & 2 \\ 3 & 5 \\ 5 & 6 \end{pmatrix}$$

(%i9) charpoly (A , x) ;

(%o9) $-(5-x)\,x-6$

(%i10) invert (A) ;

(%o10) $\begin{pmatrix} -\frac{5}{6} & \frac{1}{3} \\ \frac{1}{2} & 0 \end{pmatrix}$

(%i11) eigenvalues (A) ;

(%o11) $[[6\,,-1]\,,[1\,,1]]$

(%i12) eigenvectors (A) ;

(%o12) $[[[6\,,-1]\,,[1\,,1]]\,,[[[1\,,3]]\,,[[1\,,-\frac{1}{2}]]]]$

(%i13) limit (g (x) , x , c) ;

(%o13) $\lim\limits_{\to x \to c} \mathrm{g}(x)$

(%i14) integrate (1 + x ^ 2 , x , 0 , 10) ;

(%o14) $\dfrac{1030}{3}$

Q Let A & B be two matrix find
1. A*B(usual)
2. A^2(Usual)
3. rank of A
4. nullity of A
5. determinant of A
6. tranpose of A
7. inverse of A

(%i15) A : matrix ([0 , 2] , [3 , 5]) ;

(%o15) $\begin{pmatrix} 0 & 2 \\ 3 & 5 \end{pmatrix}$

(%i16) B : matrix ([1 , 2] , [3 , 4]) ;

(%o16) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

(%i17) A . B ;

(%o17) $\begin{pmatrix} 6 & 8 \\ 18 & 26 \end{pmatrix}$

(%i18) A ^ ^ 2 ;

(%o18) $\begin{pmatrix} 6 & 10 \\ 15 & 31 \end{pmatrix}$

(%i19) rank (A) ;

(%o19) 2

(%i20) nullity (A) ;

(%o20) 0

(%i21) determinant (A) ;

(%o21) −6

(%i22) transpose (A) ;

(%o22) $\begin{pmatrix} 0 & 3 \\ 2 & 5 \end{pmatrix}$

(%i23) invert (A) ;

(%o23) $\begin{pmatrix} -\frac{5}{6} & \frac{1}{3} \\ \frac{1}{2} & 0 \end{pmatrix}$

Q f(x) = (x²)²-2x²
1. find zeros of f(x)
2. Plot graph of f(x)
3. find f'(x) and zeros of f'(x)
4. find f''(x) and zeros of f''(x)
5. plot graph of f(x), f'(x) and f''(x)
6. find factors of f(x)

(%i24) f (x) : = (x ^ 2) ^ 2 − 2 · x ^ 2 ;

(%o24) $f(x) := \left(x^2\right)^2 - 2x^2$

(%i25) solve (f (x) = 0 , x) ;

(%o25) $[x = -\sqrt{2}, x = \sqrt{2}, x = 0]$

(%i26) multiplicities ;

(%o26) $[1, 1, 2]$

(%i27) df (x) : = ' ' (diff (f (x) , x)) ;

(%o27) $df(x) := 4x^3 - 4x$

(%i28) solve (df (x) = 0 , x) ;

(%o28) $[x = -1, x = 1, x = 0]$

(%i29) multiplicities ;

(%o29) $[1, 1, 1]$

(%i30) d2f (x) : = ' ' (diff (f (x) , x , 2)) ;

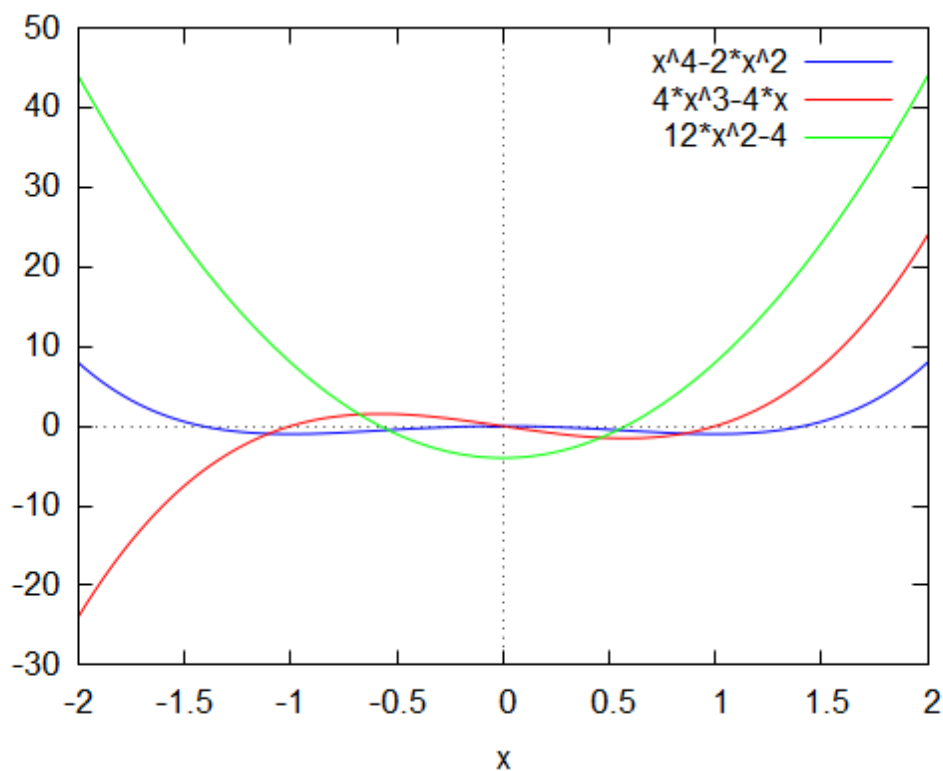(%o30) $d2f(x) := 12x^2 - 4$

(%i31) solve (d2f (x) = 0 , x) ;

(%o31) $[x = -\dfrac{1}{\sqrt{3}} , x = \dfrac{1}{\sqrt{3}}]$

(%i32) multiplicities ;

(%o32) $[1 , 1]$

(%i33) wxplot2d ([f (x) , df (x) , d2f (x)] , [x , − 2 , 2]) ;

(%t33)

(%o33)

(%i34) factor (f (x)) ;

(%o34) $x^2 \left(x^2 - 2\right)$

Q Solve the system of eqn using inverse method
2x + 3y - 4z = 4
x + 2y + 3z = 6
x - y + z = 2

(%i37) eq1 : 2 · x + 3 · y − 4 · z = 4 ;
      eq2 : x + 2 · y + 3 · z = 6 ;
      eq3 : x − y + z = 2 ;

(%o35) $-4z + 3y + 2x = 4$

(%o36) $3z + 2y + x = 6$

(%o37) $z - y + x = 2$

(%i38) A : coefmatrix ([eq1 , eq2 , eq3] , [x , y , z]) ;

(%o38) $\begin{pmatrix} 2 & 3 & -4 \\ 1 & 2 & 3 \\ 1 & -1 & 1 \end{pmatrix}$

(%i39) determinant (A) ;

(%o39)   28

(%i40) Ainv : invert (A) ;

(%o40) $\begin{pmatrix} \frac{5}{28} & \frac{1}{28} & \frac{17}{28} \\ \frac{1}{14} & \frac{3}{14} & -\frac{5}{14} \\ -\frac{3}{28} & \frac{5}{28} & \frac{1}{28} \end{pmatrix}$

(%i41) B : matrix ([4] , [6] , [2]) ;

(%o41) $\begin{pmatrix} 4 \\ 6 \\ 2 \end{pmatrix}$

(%i42) Ainv . B ;

(%o42) $\begin{pmatrix} \frac{15}{7} \\ \frac{6}{7} \\ \frac{5}{7} \end{pmatrix}$

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