DIFFERENTIAL EQUATION2013Appan Singha Roy9831326857
  
  
  
DIFFERENTIAL EQUATION
  
Serial no.
  
Form
  
Substitution
  
Full Differential
  
1.
  
dx±dy
  
x±y=v
  
d(x±y)
  
2.
  
xdx+ydy
  
x2+y2=v
  
12dx2+y2
  
3.
  
xdy+ydx
  
xy=v
  
d(xy)
  
4.
  
xdy-ydx
  
y=vx
  
x2d(yx)
  
5.
  
ydx-xdy
  
x=vy
  
y2d(xy)
  
6.
  
xdy-ydxxy
  
logyx=v
  
d(logyx)
  
7.
  
xdy-ydxx2+y2
  
tan-1yx=v
  
d(tan-1yx )
  
8.
  
ydx-xdyx2+y2
  
tan-1xy=v
  
d(tan-1xy)
  
9.
  
xdy-ydx1-x2y2
  
sin-1xy=v
  
d(sin-1xy)
  
10.
  
xdx+ydyx2+y2
  
x2+y2=v
  
12d(log⁡|x2+y2|)
  
  
Order of Differential Equation:-
  
Highest order derivative in a differential equation.
  
Degree of Differential Equation:-
  
Power of highest order derivative in a differential equation.
  
Techniques of solving a Differential Equation
  
Type 1:- dydx=fx
  
dy=fxdx
  
Type 2:- dydx=PxQy
  
dyQ(y)=P(x)dx
  
Type 3:- dydx=P(x+y)
  
Let, x+y=v so that 1+dydx=dvdx
  
Type 4:- dydx=f(x,y)g(x,y) [Homogeneous function]
  
Let, y=vx so that dydx=v+xdvdx
  
Type 5:- dydx+Pxy=Q(x)
  
iFind I.F.= eP(x)dx
  
iiThe solution is y×I.F.= Qx×I.F.dx+C
  
Type 6:- dxdy+ Pyx=Q(y)
  
iFind I.F.=eP(y)dy
  
iiThe solution is x×I.F.= Qy×I.F.dy+C

TRIGONOMETRY2013Appan Singha Roy9831326857
  
  
  
TRIGONOMETRY
  
Associated Angles
  
sin
  
All
  
tan
  
cos
  
How to find sin 960°,cos 960°,tan 960° etc.?
  
iFind out the quadrant.
  
iiIf n is even multiple of π2 , then the t-ratio will be same as given otherwise the t-ratio will be its compliment.
  
N.B.:The rotation must be ACW always.
  
Compound Angles
  
(1) sinA±B=sinAcosB ±cosAsinB
  
(2) cosA±B=cosAcosB∓sinAsinB  
(3) sinA+BsinA-B=sinA2-sinB2=cosB2-cosA2
  
(4) cosA+B cosA-B=cosA2-sinB2=cosB2-sinA2
  
(5) tanA±B= tanA ± tanB1 ∓ tanAtanB
  
(6) cotA±B= cotAcotB ∓1cotB ± cotA
  
(7) tanA+B+C= tanA+tanB+tanC-tanAtanBtanC1-tanAtanB-tanBtanC-tanCtanA
  
Transformation of Sum and Products
  
(1) sinC+sinD=2sinC+D2cosC-D2
  
(2) sinC-sinD=2cosC+D2sinC-D2
  
(3) cosC+cosD=2cosC+D2cosC-D2
  
(4) cosC-cosD=2sinC+D2sinD-C2
  
(5) 2sinAcosB=sinA+B+sin(A-B)
  
(6) 2cosAsinB=sinA+B-sin(A-B)
  
(7) 2cosAcosB=cosA+B+cos(A-B)
  
(8) 2sinAsinB=cosA-B-cos(A+B)
  
Multiple Angles
  
(1) sin2A=2sinAcosA= 2tanA1+tan2A
  
(2) cos2A=cos2A-sin2A=2cos2A-1=1-2sin2A= 1-tan2A1+tan2A
  
(3) tan2A= 1-cos2A1+cos2A
  
(4) tan2A= 2tanA1-tan2A
  
(5) tanA= 1-cos2Asin2A= sin2A1+cos2A
  
(6) sin3A=3sinA-4sin3A
  
(7) cos3A=4cos3A-3cosA
  
(8) tan3A= 3tanA-tan3A1-3tan2A
  
Sub-multiple Angles
  
(1) sin18°=cos72°= 5-14
  
(2) sin36°=cos54°= 1410-25
  
(3) sin54°=cos36°= 5+14
  
(4) sin72°=cos18°= 1410+25
  
Trigonometric Equations
  
(1) (i) Ifsinθ=0, then θ=nπ
  
 (ii) Ifsinθ=sinα, then θ=nπ+-1nα
  
(2) (i) cosθ=0, then θ=(2n+1)π2
  
 (ii) cosθ=cosα, then θ=2nπ ± α
  
(3) (i) tanθ=0, then θ=nπ
  
 (ii) tanθ=tanα, then θ=nπ+ α
  
Inverse Circular Function
  
Principle Value→-π2,π2
  
(1) sinsin-1x=x ;coscos-1x=x ;tan(tan-1x)=x
  
(2) sin-1-x= - sin-1x ; cos-1-x= π- cos-1x ; tan-1-x= - tan-1x;
  
 cot-1-x= π- cot-1x ; cosec-1-x= - cosec-1x ; sec-1-x= π- sec-1x.
  
(3) sin-1x= cosec-11x ; cos-1x= sec-11x ; tan-1x= cot-11x when x>0 &
  
 tan-1x= cot-11x- π when x<0.
  
(4) (i) sin-1x+ cos-1x= π2 (-1≤x≤1)
  
 (ii) tan-1x+ cot-1x= π2 (-∞<x<∞)
  
 (iii) sec-1x+ cosec-1x= π2 (x≤-1, or, x≥1)
  
(5) tan-1x ± tan-1y= tan-1x ±y1 ∓xy [At principal value]
  
(6) sin-1x ± sin-1y= sin-1x1-y2 ±y1- x2 [At principal value]
  
(7) cos-1x ± cos-1y= cos-1xy ∓ 1- x21- y2 [At principal value]
  
(8) 2 tan-1x= sin-12x1+x2= cos-11-x21+x2= tan-12x1-x2