MAT 331- Differential Equations and its applications: Revision Questions

Solve the following.

$\frac{dy}{dx}=\frac{1+y}{\sqrt{1-x^2}}$	$\frac{dy}{dx}+y\cos x=\sin x\cos x.$
$(3x+2y-5)\,dx+(2x+3y-5)\,dy=0$	$x\,dy-y\,dx=\sqrt{x^2+y^2}\,dx.$
$\frac{dy}{dx}+y\sec x=\tan x.$	$y^2\,dx+x(x-y)\,dy=0$
$\frac{dy}{dx}=\frac{x+2y+6}{x-y-2}.$	$\frac{dy}{dx}+\frac{1+y^2}{1+x^2}=0$
$(x+1)\frac{dy}{dx}-y=e^x(x+1)^2.$	$\frac{dy}{dx}+y\cot x=\sin x.$
$\sin x\frac{dy}{dx}-y\cos x+y^2=0.$	$\frac{dy}{dx}=\frac{x-y+1}{x+2y-3}.$
$\sec^2 x\tan y\,dx+\sec^2 y\tan x\,dy=0$	$(x-2y+5)\,dx-(2x+y-1)\,dy=0.$
$x\sqrt{1+y^2}\,dx+y\sqrt{1+x^2}\,dy=0$	$\frac{dy}{dx}+y\tan x=\sin 2x$
$e^x\tan y\,dx+(1-e^x)\sec^2 y\,dy=0$	$(1+x^2)\frac{dy}{dx}+2xy=4x^2$
$(e^y+1)\cos x\,dx+e^y\sin x\,dy=0$	$(e^y+1)\cos x\,dx+e^y\sin x\,dy=0.$
$\frac{dy}{dx}+\frac{2x}{1+x^2}y=\frac{1}{(1+x^2)^2}.$	$\frac{dy}{dx}+y\tan x=\sec x$
$\frac{dy}{dx}+y=e^{-x}.$	$\frac{dy}{dx}+y\cot x=2.$
$x\frac{dy}{dx}-2y=2x.$	$\frac{dy}{dx}+y\tan x=\sec x$

$\dfrac{dy}{dx}+2y\tan x=y^2.$	$\dfrac{dy}{dx}-y\tan x=y^2\sec x.$
$(x^2-4xy-2y^2)dx=(y^2-4xy-2x^2)dy.$	$ye^{xy}\,dx+(xe^{xy}+2y)dy=0.$
$\frac{dy}{dx}+\frac{x^2+3y^2}{3x^2+y^2}=0.$	$\dfrac{dy}{dx}=e^{x+y}.$
$e^x\tan y\,dx+(1-e^x)\sec^2 y\,dy=0.$	$\dfrac{dy}{dx}+xy=xy^3.$
$(e^y+1)\cos x\,dx+e^y\sin x\,dy=0.$	$\dfrac{dy}{dx}+y\tan x=y^3\sec x.$
$\dfrac{dy}{dx}=e^{2x-3y}+4x^2e^{-3y}$	$\left(x^2y-x^2\right)dx+\left(xy^2-y^2\right)dy=0.$
$e^x\tan y\,dx+(1-e^x)\sec^2 y\,dy=0.$	$y\,dx+(1+x^2)\tan^{-1}x\,dy=0.$
$x\dfrac{dy}{dx}+\dfrac{y^2}{x}=y.$	$\dfrac{dy}{dx}+1=e^{x+y}.$
$x\dfrac{dy}{dx}=y+x\cos^2\left(\dfrac{y}{x}\right).$	$\dfrac{dy}{dx}=e^{x+y}+x^2e^y$
$\sin x\dfrac{dy}{dx}-y\cos x+y^2=0.$	$xy\dfrac{dy}{dx}=y+2$
$\left[x\tan\left(\frac{y}{x}\right)-y\sec^2\left(\frac{y}{x}\right)\right]dx+x\sec^2\left(\frac{y}{x}\right)dy=0.$	$\tan y\dfrac{dy}{dx}=\sin(x+y)+\sin(x-y)$
$x\,dy-y\,dx=\sqrt{x^2+y^2}\,dx.$	$\dfrac{dy}{dx}+y\tan x=y^3\sec x.$
$y^2\,dx+x(x-y)dy=0.$	$x\dfrac{dy}{dx}+y=x^3y^2\cos x.$
$x(y-x)\,dy-y(x+y)\,dx=0.$	$\dfrac{dy}{dx}-2y=e^{2x}.$
$\left(x^3+y^3\right)dx-\left(x^2y+xy^2\right)dy=0$	$\dfrac{dy}{dx}+2xy=x^3.$
$\dfrac{dy}{dx}-\sin\left(\dfrac{y}{x}\right)=\dfrac{y}{x}.$	$(1+x^2)\dfrac{dy}{dx}+2xy=4x^2.$

$\frac{dy}{dx} + \frac{y}{x} = x y^2.$	$(1+x^2)\frac{dy}{dx} + y = \tan^{-1} x.$
$\frac{dy}{dx} + xy = xy^3.$	$\frac{dy}{dx} + y \cot x = 2\cos x.$
$x\frac{dy}{dx} + y = x^3 y^6.$	$\cos^2 x \frac{dy}{dx} + y = \tan x.$
$2x\frac{dy}{dx} - y = 10x^3 y^5.$	$\frac{dy}{dx} + \frac{y}{x} = x y^2.$
$\frac{dy}{dx} + y \tan x = y^3 \sec x.$	$x\frac{dy}{dx} + y = x^3 y^6.$
$x \frac{dy}{dx} + y = x^3 y^2 \cos x.$	$2x\frac{dy}{dx} - y = 10x^3 y^5.$
$\frac{dy}{dx} + 2y \tan x = y^2.$	$3x(xy-2)dx + (x^3 + 2y)dy = 0.$
$\sin x \frac{dy}{dx} - y\cos x + y^2 = 0.$	$\frac{dy}{dx} = e^{2x-3y} + 4x^2 e^{-3y}$
$(e^y + 1)\cos x \, dx + e^y \sin x \, dy = 0.$	$(1+\cos 2y)\, dx + (1-\cos 2x)\, dy = 0$
$\frac{dy}{dx} = e^{2x-3y} + 4x^2 e^{-3y}$	$\left(x^2 y - x^2\right) dx + \left(xy^2 - y^2\right) dy = 0$.
$(1+\cos 2y)\, dx + (1-\cos 2x)\, dy = 0$	$y\, dx + (1+x^2)\tan^{-1} x\, dy = 0.$
$\left(x^2 y - x^2\right) dx + \left(xy^2 - y^2\right) dy = 0$.	$\frac{dy}{dx} + 1 = e^{x+y}.$
$y\, dx + (1+x^2)\tan^{-1} x\, dy = 0.$	$\frac{dy}{dx} - x\tan(y-x) = 1.$
$\frac{dy}{dx} + 1 = e^{x+y}.$	$\frac{dy}{dx} = (x+y)^2.$
$\frac{dy}{dx} - x\tan(y-x) = 1.$	$\frac{dy}{dx} = \cos(x+y).$
$\frac{dy}{dx} = (x+y)^2.$	$x\frac{dy}{dx} + \frac{y^2}{x} = y.$

$\frac{dy}{dx} = \cos(x+y)$.	$x\,\frac{dy}{dx} = y + x\cos^2\left(\frac{y}{x}\right)$.
$x\,\frac{dy}{dx} + \frac{y^2}{x} = y$.	$\frac{dy}{dx} = \left(\frac{y}{x}\right)\left(\log\left(\frac{y}{x}\right)+1\right)$.
$x\,\frac{dy}{dx} = y + x\cos^2\left(\frac{y}{x}\right)$.	$\frac{dy}{dx} = \frac{y}{x} + \tan\left(\frac{y}{x}\right)$.
$\frac{dy}{dx} = \left(\frac{y}{x}\right)\left(\log\left(\frac{y}{x}\right)+1\right)$.	$\left(x^2+2y^2\right)dx - xy\,dy = 0$.
$\frac{dy}{dx} = \frac{y}{x} + \tan\left(\frac{y}{x}\right)$.	$\frac{dy}{dx} = e^{2x-3y} + 4x^2 e^{-3y}$
$\left(x^2+2y^2\right)dx - xy\,dy = 0$.	$(1+\cos 2y)\,dx + (1-\cos 2x)\,dy = 0$
$\left(x^3+y^3\right)dx - \left(x^2y+xy^2\right)dy = 0$.	$\frac{dy}{dx} = \left(\frac{y}{x}\right)\left(\log\left(\frac{y}{x}\right)+1\right)$.
$\frac{dy}{dx} - \sin\left(\frac{y}{x}\right) = \frac{y}{x}$.	$\frac{dy}{dx} = \frac{y}{x} + \tan\left(\frac{y}{x}\right)$.
$\frac{dy}{dx} - x\tan(y-x) = 1$.	$\frac{dy}{dx} = 1 + \frac{y}{x} + \frac{y^2}{x^2}$.
$\frac{dy}{dx} = (x+y)^2$.	$\left(x^2+y^2\right)dy - xy\,dx = 0$.
$\frac{dy}{dx} = \frac{1+y}{\sqrt{1-x^2}}$.	$\frac{dy}{dx} = \frac{2x+5y+1}{5x+2y-1}$
$\frac{dy}{dx} + \frac{1+y^2}{1+x^2} = 0$.	$2xy^2\,dy - \left(x^3+2y^3\right)dx = 0$.
$\tan y\,\frac{dy}{dx} = \sin(x+y) + \sin(x-y)$.	$x(y-x)\,dy - y(x+y)\,dx = 0$.
$\frac{dy}{dx} = e^{2x-3y} + 4x^2 e^{-3y}$.	$\frac{dy}{dx} + \frac{2x}{1+x^2}\,y = \frac{1}{(1+x^2)^2}$.
$(1+\cos 2y)\,dx + (1-\cos 2x)\,dy = 0$.	$\frac{dy}{dx} + y = e^{-x}$.

$\frac{dy}{dx}=\frac{x^2 y}{x^3+y^3}$.	$sec^2 x \tan y\, dx + sec^2 y \tan x\, dy = 0$.
$(x+y+1)^2 \frac{dy}{dx}=1$.	$x\sqrt{1+y^2}\, dx + y\sqrt{1+x^2}\, dy = 0$.
$\frac{dy}{dx}=\cos(x+y)$.	$\frac{dy}{dx}+\frac{1}{x}\tan y=\frac{1}{x^2}\tan y \sin y$.
$\frac{dy}{dx}=\frac{1}{\cos(x+y)}$.	$x\frac{dy}{dx}+y=y^2\log x$.
$\frac{dy}{dx}=\sin(x+y)+\cos(x+y)$.	$\left(xy^2-xe^{1/x^2}\right)dx - x^2 y\,dy = 0$.
$\frac{dy}{dx}=\sin(x+y)$.	$\frac{dy}{dx}+\left(2x\tan^{-1}y-x^3\right)\left(1+y^2\right)=0$.
$\frac{dy}{dx}=\frac{1}{\sin(x+y)}$.	$\frac{dy}{dx}+x\sin 2y = x^3\cos^2 y$.
$\frac{dy}{dx}=\frac{6x-2y-7}{3x-y+4}$.	$\frac{dy}{dx}+\frac{1}{x}\tan y=\frac{1}{x^2}\tan y \sin y$.
$\frac{dy}{dx}=\frac{2x-y+1}{2y-x-1}$.	$(x^2-by)dx-(y^2+bx)dy=0$.
$\frac{dy}{dx}-2y\tan x = y^2\tan^2 x$.	$(3x^2+2y)dx+(5y^3+2x)dy=0$
$2\frac{dy}{dx}-y\sec x = y^3\tan x$.	$\frac{dy}{dx}=\sqrt{\frac{1-y^2}{1-x^2}}$.
$x\sqrt{1+y^2}dx+y\sqrt{1+x^2}dy=0$.	$x\sqrt{1-y^2}dx+y\sqrt{1-x^2}dy=0$.
$\sec^2 x\; tanydx+\sec^2 y\; tanxdy=0$	$(e^y+1)cosxdx+e^y sinxdy=0$.
$\frac{dy}{dx}=\frac{1+y}{\sqrt{1-x^2}}$	$\frac{dy}{dx}-y\tan x = y^2\sec x$.
$x\frac{dy}{dx}+y=x^3y^6$.	$x\frac{dy}{dx}+y=x^3y^2\cos x$.

$2x\frac{dy}{dx}-y=10x^3y^5.$	$\cos x\,dy=y(\sin x-y)\,dx.$
$\frac{dy}{dx}+2y\tan x=y^2.$	$\frac{dy}{dx}+\frac{1}{x}\sin 2y=x^3\cos^2 y.$
$\sin x\frac{dy}{dx}-y\cos x+y^2=0.$	$\frac{dy}{dx}=\frac{x-y-2}{2x-2y-3}.$
$(x^3+3xy^2)dx+(y^3+3yx^2)dy=0.$	$\frac{dy}{dx}=\frac{2x+y+1}{x+2y-1}.$
$(x^2-by)dx-(y^2+bx)dy=0.$	$\frac{dy}{dx}=\frac{x+y+1}{2x+2y+3}.$
$(3x^2+2y)dx+(5y^3+2x)dy=0$	$\frac{dy}{dx}+\frac{1+y^2}{1+x^2}=0.$
$\frac{dy}{dx}=\frac{x-y+3}{2x-2y+5}.$	$\frac{dy}{dx}=\frac{x^2+y^2}{x(x+y)}.$

$(2y\sin x+\cos y)dx-(x\sin y+2\cos x+\tan y)dy=0.$

$(\cos x-3x^2\tan y)dx-x^3\sec^2 y\,dy=0.$

$y\sin 2x\,dx-(1+y^2+\cos^2 x)\,dy=0.$

$(2xy+y-\tan y)\,dx+(x^2-x\tan^2 y+\sec^2 y)dy=0.$

$[e^y+y\cos(xy)]dx+[xe^y+x\cos(xy)]dy=0.$

$ye^{xy}dx+(xe^{xy}+2y)dy=0.$

$(y\cos x+\sin y+y)dx+(\sin x+x\cos y+x)dy=0.$

$(x-2y+5)dx-(2x+y-1)dy=0$

$(y^2e^{xy^2}+4x^3)\,dx+(2xye^{xy^2}-3y^2)\,dy=0.$

$(\sec x\tan x\tan y-e^x)\,dx+\sec x\sec^2 y\,dy=0.$

$(3x+2y-5)dx+(2x+3y-5)dy=0$

$(y\cos x+\sin y+y)dx+(\sin x+x\cos y+x)dy=0.$

$(3x^2y^2+x^2)dx+(2x^3y+y^2)dy=0.$

$(2y\sin x+\cos y)dx-(x\sin y+2\cos x+\tan y)dy=0.$

$(x^2-2xy)dx+(\sin y-x^2)dy=0.$

$$(\cos x - 3x^2 \tan y)dx - x^3 \sec^2 y\, dy = 0.$$

$$xy\log\left(\frac{x}{y}\right)dx + \left[y^2 - x^2\log\left(\frac{x}{y}\right)\right]dy = 0.$$

$$\left(1 + e^{x/y}\right)dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0.$$

$$\left(x\cos\left(\frac{y}{x}\right) + y\sin\left(\frac{y}{x}\right)\right)y\,dx - \left(y\sin\left(\frac{y}{x}\right) - x\cos\left(\frac{y}{x}\right)\right)x\,dy = 0$$

$$\left(x\tan\left(\frac{y}{x}\right) - y\sec^2\left(\frac{y}{x}\right)\right)dx + x\sec^2\left(\frac{y}{x}\right)dy = 0.$$

$$\left(y^2 + 2xy\right)dx + \left(2x^2 + 3xy\right)dy = 0.$$

$$(2xy + y - \tan y)\,dx + (x^2 - x\tan^2 y + \sec^2 y)\,dy = 0.$$

$$[e^y + y\cos(xy)]dx + [xe^y + x\cos(xy)]dy = 0.$$

$$(y^2 e^{xy^2} + 4x^3)\,dx + (2xye^{xy^2} - 3y^2)\,dy = 0.$$

$$(\sec x\,\tan x\,\tan y - e^x)\,dx + \sec x\,\sec^2 y\,dy = 0.$$

$2xy^2 dy - \left(x^3 + 2y^3\right)dx = 0$.||| $2xy\dfrac{dy}{dx} = 3y^2 + x^2$. ||| $\dfrac{dy}{dx} = \dfrac{x^2 y}{x^3 + y^3}$.

$\dfrac{dy}{dx} = 1 + \dfrac{y}{x} + \dfrac{y^2}{x^2}$. |||$\left(x^2 + y^2\right)dy - xy\,dx = 0$.

$\dfrac{dy}{dx} + y\cot x = 4x\,\mathrm{cosec}x$. ||| $\dfrac{dy}{dx} + y\cot x = \sin x$.

$\dfrac{dy}{dx} + y\tan x = \sin 2x$.|||| $x\dfrac{dy}{dx} + y = x^3 y^2 \cos x$.

$y\sin 2x\,dx - (1 + y^2 + \cos^2 x)\,dy = 0$.|||| $\dfrac{dy}{dx} + \sqrt{\dfrac{1-y^2}{1-x^2}} = 0$.

$\dfrac{dy}{dx} = e^{x-y}$.|||| $\dfrac{dy}{dx} = e^{x+y} + x^2 e^y$.|||| $\dfrac{dy}{dx} = (4x + y + 1)^2$.

$xy\,\frac{dy}{dx}=y+2$.|||| $\left(x^2+2y^2\right)dx-xy\,dy=0$.

$2xy\frac{dy}{dx}=3y^2+x^2$.|||| $\frac{dy}{dx}=\frac{x-y+1}{x+2y-3}$.

$(x-2y+5)\,dx-(2x+y-1)\,dy=0$.

$(3x+2y-5)\,dx+(2x+3y-5)\,dy=0$.

$\frac{dy}{dx}-2y=e^{2x}$.|||| $\frac{dy}{dx}+2xy=x^3$.|||| $(1+x^2)\frac{dy}{dx}+2xy=4x^2$.

$(1+x^2)\frac{dy}{dx}+y=\tan^{-1}x$.|||| $(1+y^2)\,dx=(\tan^{-1}y-x)\,dy$.

$\frac{dy}{dx}+y\cot x=2\cos x$.|||||| $x\frac{dy}{dx}-2y=2x$.

$\frac{dy}{dx}+y\cot x=4x\,\operatorname{cosec}x$.||||| $\frac{dy}{dx}+y\sec x=\tan x$.

$x\frac{dy}{dx}+y\log y=xye^x$.|||| $\frac{dy}{dx}+y\tan x=\sec x$.

$\frac{dy}{dx}+y\tan x=\sin 2x$.|||| $\frac{dy}{dx}+y\cos x=\sin x\cos x$.

$\cos^2 x\,\frac{dy}{dx}+y=\tan x$.||||| $(y\cos x+1)\,dx+\sin x\,dy=0$.

$(x+1)\frac{dy}{dx}-y=e^x(x+1)^2$.||||| $\tan y\,\frac{dy}{dx}+\tan x=\cos y\cos^2 x$.

$\frac{dy}{dx}+\frac{1}{x}=\frac{e^y}{x^2}$.||||| $\frac{dy}{dx}+\frac{y}{x}=xy^2$.|||| $\frac{dy}{dx}+xy=xy^3$.

$\frac{dy}{dx}+y\tan x=y^3\sec x$.|||||$3x(xy-2)\,dx+(x^3+2y)\,dy=0$.

$y\sin 2x\,dx-(1+y^2+\cos^2 x)\,dy=0$.

$(y\cos x+\sin y+y)\,dx+(\sin x+x\cos y+x)\,dy=0$.

$(3x^2y^2+x^2)\,dx+(2x^3y+y^2)\,dy=0$.

$(e^y+1)\cos x\,dx+e^y\sin x\,dy=0$.

$(2y\sin x+\cos y)\,dx-(x\sin y+2\cos x+\tan y)\,dy=0$.

$(x^2-2xy)dx+(\sin y-x^2)dy=0$.

$(\cos x-3x^2\tan y)dx-x^3\sec^2 y\,dy=0$.

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$\frac{dy}{dx}=\frac{y-x+1}{y+x+5}$.|||| $\frac{dy}{dx}=\frac{x+2y-3}{2x+y-3}$.||||| $\frac{dy}{dx}-\frac{\tan y}{1+x}=(1+x)e^x\sec y$.

$2y\sec^2 y^2\frac{dy}{dx}-\frac{2}{x+1}\tan y^2=(x+1)^3$. |||$\frac{dy}{dx}+1=e^x$.

$(4x+3y+1)dx+(3x+2y+1)dy=0$.||$(12x+5y-9)dx+(5x+2y-4)dy=0$.

$(x^2+y)dx+(y^3+x)dy=0$.||||

$\frac{dy}{dx}+y\cot x=2\cos x$.||| $\frac{dy}{dx}+y\tan x=\sin 2x$.|| $(1+x^2)\frac{dy}{dx}+2xy=4x^2$

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$\frac{dy}{dx}+y\cot x=\cos ecx$.|||$\frac{dy}{dx}-\frac{2}{x}y=x+x^2$

$\frac{dy}{dx}+\frac{2x}{1+x^2}y=\frac{1}{(1+x^2)^2}$.|||| $\frac{dy}{dx}=(x+y)^2$. ||| $\frac{dy}{dx}+1=e^{x+y}$.

$\frac{dy}{dx}=(x+y+1)^2$.||| $\frac{dy}{dx}=\frac{x+y-1}{x+y+1}$.||| $\frac{dy}{dx}=\frac{1}{x+y}$.|| $1-\frac{dy}{dx}=e^{x-y}$.

$\frac{dy}{dx}=1-x-y$.||| $\frac{dy}{dx}=1+x+y$.|||| $\frac{dy}{dx}+\frac{y}{x}=xy^2$.

$\frac{dy}{dx}+xy=xy^3$.|||| $x\frac{dy}{dx}+y=x^3y^6$.|||| $2x\frac{dy}{dx}-y=10x^3y^5$.

$\frac{dy}{dx}+y\tan x=y^3\sec x$.|||| $x\frac{dy}{dx}+y=x^3y^2\cos x$.||| $\frac{dy}{dx}+2y\tan x=y^2$.

$\sin x\frac{dy}{dx}-y\cos x+y^2=0$.|| $\left[xtan\left(\frac{y}{x}\right)-ysec^2(\frac{y}{x})\right]dx+xsec^2\left(\frac{y}{x}\right)dy=0$.

$\left(1+e^{\frac{x}{y}}\right)dx+e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)dy=0$.

$(x^2-4xy-2y^2)dx=(y^2-4xy-2x^2)dy$.

$\frac{dy}{dx}+\frac{x^2+3y^2}{3x^2+y^2}=0$.||| $x\sqrt{1+y^2}dx+y\sqrt{1+x^2}dy=0$.

$\sec^2 x\,tanydx+\sec^2 y\,tanxdy=0$

$(e^y+1)cosxdx+e^y sinxdy=0$.

$\frac{dy}{dx}+1=e^x$.||| $\frac{dy}{dx}=\sqrt{\frac{1-y^2}{1-x^2}}$.|| $x\sqrt{1-y^2}dx+y\sqrt{1-x^2}dy=0$.

$\frac{dy}{dx} = \frac{1+y}{\sqrt{1-x^2}}$.|||| $\frac{dy}{dx} + \frac{1+y^2}{1+x^2} = 0$. ||$(4x + 3y + 1)dx + (3x + 2y + 1)dy = 0$.

$(12x + 5y - 9)dx + (5x + 2y - 4)dy = 0$. ||||$(x^2 + y)dx + (y^3 + x)dy = 0$

$(x^2 - by)dx - (y^2 + bx)dy = 0$.||||$(3x^2 + 2y)dx + (5y^3 + 2x)dy = 0$

$(x^3 + 3xy^2)dx + (y^3 + 3yx^2)dy = 0$.||||| .

$\frac{dy}{dx} + y \tan x = \sec x$.||| $\frac{dy}{dx} + y \cot x = 2\cos x$ $\frac{dy}{dx} + y \cot x = 2$.

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$\frac{dy}{dx} + y \tan x = \sin 2x$.||| $(1+x^2)\frac{dy}{dx} + 2xy = 4x^2$.||$\frac{dy}{dx} + y\, tanx = sin2x$. .||

$\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$.|||$\frac{dy}{dx} - \frac{2}{x}y = x + x^2$

$\frac{dy}{dx} + \frac{2x}{1+x^2}\, y = \frac{1}{(1+x^2)^2}$.||| $\frac{dy}{dx} = (x+y)^2$.

$\frac{dy}{dx} + 1 = e^{x+y}$. |||| $\frac{dy}{dx} = (x + y + 1)^2$.

$\frac{dy}{dx} = \frac{x+y-1}{x+y+1}$.||||| $\frac{dy}{dx} = \frac{1}{x+y}$.||||| $1 - \frac{dy}{dx} = e^{x-y}$.

$\frac{dy}{dx} = 1 - x - y$.||| $\frac{dy}{dx} = 1 + x + y$.|||| $\frac{dy}{dx} + \frac{y}{x} = x y^2$.

$\frac{dy}{dx} + xy = xy^3$.||| $x\frac{dy}{dx} + y = x^3 y^6$.|||| $2x\frac{dy}{dx} - y = 10x^3 y^5$.

$\frac{dy}{dx} + 2y\tan x = y^2$.||||| $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$.

$\frac{dy}{dx} = \frac{x+2y-3}{2x+y-3}$.|||| $\frac{dy}{dx} = \frac{1+x+3y}{1-2x-y}$.||| $\frac{dy}{dx} = \frac{y-x+1}{y+x+5}$.

$\frac{dy}{dx} = \frac{2x+2y+3}{2x+y-3}$.||| $\frac{dy}{dx} = \frac{x+2y+6}{x-y-2}$.||| $\frac{dy}{dx} = \frac{2x-y+1}{2y-x-1}$.

$\frac{dy}{dx} = \frac{7x-3y-7}{7y-3x+3}$.||| $\frac{dy}{dx} = \frac{2x+y+1}{x+2y-1}$.

$\sec^2 x \tan y\, dx + \sec^2 y \tan x\, dy = 0$.|| $x\sqrt{1+y^2}\, dx + y\sqrt{1+x^2}\, dy = 0$.

$\frac{dy}{dx} = e^{x+y} + x^2 e^y$.|| $(e^y + 1)\cos x \, dx + e^y \sin x \, dy = 0$.

$\frac{dy}{dx} = (x+y)^2$.|| $\frac{dy}{dx} + 1 = e^{x+y}$.|| $x\frac{dy}{dx} = y + x\cos^2\left(\frac{y}{x}\right)$.

$\frac{dy}{dx} = \left(\frac{y}{x}\right)\left(\log\left(\frac{y}{x}\right) + 1\right)$.||| $\frac{dy}{dx} = \frac{y}{x} + \tan\left(\frac{y}{x}\right)$.|| $\frac{dy}{dx} - \sin\left(\frac{y}{x}\right) = \frac{y}{x}$.

$\left(x^2 + 2y^2\right) dx - xy\, dy = 0$.||| $y^2\, dx + x(x-y)\, dy = 0$.

$2xy^2 dy - \left(x^3 + 2y^3\right) dx = 0$.||| $x(y-x)\, dy - y(x+y)\, dx = 0$.

$2xy\frac{dy}{dx} = 3y^2 + x^2$.|| $\left(x^2 + y^2\right) dy - xy\, dx = 0$.

$\frac{dy}{dx} + y\cot x = 2\cos x$.||| $\frac{dy}{dx} + y\sec x = \tan x$.

$\frac{dy}{dx} + y\tan x = \sec x$.||| $\frac{dy}{dx} + y\cot x = \sin x$.

$(1+x^2)\frac{dy}{dx} + y = \tan^{-1} x$.||| $\frac{dy}{dx} + y\cos x = \sin x \cos x$.

$\cos^2 x \frac{dy}{dx} + y = \tan x$.||||

$(x+1)\frac{dy}{dx} - y = e^x (x+1)^2$.

$\frac{dy}{dx} + \frac{2x}{1+x^2} y = \frac{1}{(1+x^2)^2}$.

Orthogonal Trajectories

Show that the family of curves $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1$ is self orthogonal, where λ is a parameter.

Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2} + \frac{y^2}{a^2+\lambda} = 1$, where λ is a parameter.

Find the orthogonal trajectories of the family of circles $x^2 + y^2 + 2gx + c = 0$, where g is a parameter.

Find the orthogonal trajectories of the family of curves $x^2 + y^2 + 2gx = 0$, where g is a parameter.

Find the orthogonal trajectories of the family of circles through origin and centers lying on the x-axis.

Find the orthogonal trajectories of the family of curves $x^2 + 3y^2 = \lambda y$, where λ is a parameter.

Show that the family of parabolas $y^2 = 4a(x+a)$ is self-orthogonal, where a is a parameter.

Show that the family of parabolas $x^2 = 4a(y+a)$ is self-orthogonal, where a is a parameter.