Implicit Differentiation Worksheet ICMAB 2016

 Find $\frac{dy}{dx}$

1. $5y^{2}+\sin(y)=x^{2}$
2. $x^{3}+xy-2x=1$
3. $\sqrt{y}-\sin(x)=2$
4. $x^{2}y+3xy^{3}=x$
5. $\frac{1}{x}+\frac{1}{y}=1$
6. $\sin(\left(x^{2}y^{2}\right)=x)$
7. $\left(\tan(\left(xy^{2}+y\right))\right)^{3}=x$
8. $\sin(\left(x+y\right)=y^{2}\cos(x))$
9. 4$\cos(x)\sin(y)=π$
10. $\sqrt[3]{x+y}=1+x^{2}y^{2}$

 Find $\frac{dx}{dy}$

1. $\sqrt{xy}=1+x^{3}y$
2. $\sin(x)+\sin(y)=\sin(x)\sin(y)$
3. $\tan(\left(\frac{x}{y}\right)=x+y)$
4. $\sqrt{y}-\sin(x)=2x+y$
5. $x^{2}+xy+y^{2}=7$

 Find $\frac{d^{2}y}{dx^{2}}$

1. $4x^{2}+2y^{2}=49$
2. $y+\sin(y)=x$
3. $x\cos(y)=y$
4. $2xy-y^{2}=3$
5. $x^{3}y^{3}-4=0$

Find the Equation of the Line Tangent to y=f(x) at the Given Point:

1. $x^{2}+xy+y^{2}=3$ at (1,1)
2. $x^{2}+2xy-y^{2}+x=2$ at (1,2)
3. $y^{2}\left(y^{2}-4\right)=x^{2}\left(x^{2}-5\right)$ at $\left(0,-2\right)$
4. $x^{3}+y^{3}=6xy$ at (3,3)
5. $For number 24 find where the tangent line is horizontal.$
6. Find $a and b $such that $x^{2}y+ay^{2}=b$ if (1,1) is on the graph and the line tangent at (1,1) has the equation $4x+3y=7$.
7. Find the equations of 2 lines through the origin and tangent to

$x^{2}-4x+y^{2}+3=0$.

1. Find $\frac{dy}{dx}$ if $2y^{3}t+ t^{3}y=1$ and $\frac{dt}{dx}=\frac{1}{\cos(t)}$ .
2. Find where the vertical and horizontal tangent lines to $x^{4}+y^{4}=16$ occur.
3. Find where the vertical and horizontal tangent lines to

 2$\left(x^{2}+y^{2}\right)^{2}=25\left(x^{2}-y^{2}\right)$occur.