Implicit function

1. If $2x^2 - 3y^2 = 2xy$, find $\frac{dy}{dx}$
2. Find $\frac{dy}{dx}$ in terms of x and y if $x^2 \sin y + 2x = y$
3. Find the value of $\frac{dy}{dx}$ at the point (4,2) which lies on the curve $x^2 - xy - y^2 - 2y = 0$
4. Given the implicit function $2x^3 - 3x^2y - 4xy^2 = 5$, find $\frac{dy}{dx}$ in terms of x and y
5. Given the implicit function $xe^x + y \ln x = 5$, find $\frac{dy}{dx}$ in terms of x and y
6. Find the value of $\frac{dy}{dx}$ at the point (-1,2) which lies on the curve $2x^2 + 3y^2 - 6xy = 26$
7. Given that $y = a^x$, where a is a real number, find $\frac{dy}{dx}$ in terms of a and x
8. Given that $y = tan^{-1}x$, find $\frac{dy}{dx}$
9. Given that $y = \frac{\cos x}{e^{2x}}$, show that $5y + 4\frac{dy}{dx} + \frac{d^2y}{dx^2} = 0$
10. Given that $y = \frac{1}{\sin x}$, show that $y\frac{d^2y}{dx^2} = y^2 + 2(\frac{dy}{dx})^2$
11. Find $\frac{dy}{dx}$ for $x^2 - y^2 = 4xy + 1$
12. Find $\frac{dy}{dx}$ for $(x + y)^4 + 6x^2 = 3$
13. Given the function $3x^2 + y^2 = 7$. Express $\frac{d^2y}{dx^2}$ in terms of y
14. Given that $y^{xy} = 2e^y + e^x$, find $\frac{dy}{dx}$ at y=1
15. Given that$x^2y = a \cos bx$, where a and b are constants. Show that $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + (b^2x^2 + 2)y = 0$
16. Given that $\sin(x + y) = y^3 \cos x$ .Find $\frac{dy}{dx}$ if $x = y = \frac{\pi}{4}$
17. Given that $\tan x + \tan y = 5$. Find the value of $\frac{dy}{dx}$ when $x = \frac{1}{4}\pi$
18. A curve is defined by the equation $x^3 + y^3 + 3xy - 15 = 0$. Find the gradient of this curve at the point (1,2)
19. Given that $3x^2 + xy + y^2 = 132$. Find the coordinates of the points on the curve at which the tangent is parallel to the x-axis.
20. A curve C is defined by the equation $y^3 + y^2 + y = x^2 - 2x$. Find the equations of the tangent and normal to the curve C at the point (-1,1)
21. The curve $y(x + y) = 1 + sn\ x$ intersects the positive y-axis at point N. Show that the tangent of the curve at point N is parallel to the x-axis
22. A curve is defined by the equation $2y = x^2 + \sin y$
    a. Find $\frac{dy}{dx}$ in terms of x and y
    b. Show that the gradient of the equation is defined at every point on the curve