# Assignment First 

January 31, 2013

1. For each of this problem, write down the Maple commands to solve the given equations.The answer to part 1a is given below; you must do the others.
(a)

$$
\begin{aligned}
& \quad x^{2} y^{\prime}+x y-y^{2}=0 \\
& \quad>\text { ode }:=x^{2} * \operatorname{diff}(y(x), x)+x * y(x)-y(x)^{2}=\quad 0 \\
& >\text { dsolve }(\text { ode }, y(x))
\end{aligned}
$$

(b)

$$
y^{\prime}=\frac{x y+y^{2}}{x^{2}}
$$

(c)

$$
y^{\prime \prime}+y=x^{2}+2 .
$$

(d)

$$
y "+4 y=5 e^{-} x
$$

2. In each of this problem write down the Maple commands to solve the given initial-value problems. The answer to part 1a is given below; you must do the others.
(a)

$$
\begin{array}{r}
x^{2} y^{\prime}+x y-y^{2}=0, \text { subject to } y(1)=\frac{1}{3} \\
>\operatorname{dsolve}(\{\text { ode, } y(1)=1 / 3\}, y(x))
\end{array}
$$

(b)

$$
y^{\prime}=\frac{x y+y^{2}}{x^{2}}, \text { subject to } y(1)=\frac{2}{3} .
$$

(c)

$$
y^{\prime}-t y=\sin ^{2} t, \text { subject to } y(\pi)=5 .
$$

3. In each of this problem do the following:
(a) Find $y(3)$ and plot $y(x)$ for $1 \leq x \leq 2$ if $y(x)$ is the solution of the initial value problem $x^{2} y^{\prime}+x y-y^{2}=0$, subject to $y(1)=\frac{1}{3}$.
(b) Show that $y^{2}+x-3=0$ is an implicit solution to $y^{\prime}=\frac{-1}{2 y}$.
(c) Show that $\phi(x)=x^{2}$ is an explicit solution to $x y^{\prime}=2 y$.
(d) Determine whether the function $x=2$ cost $-3 \sin t$ is a solution to the differential equation,$x "+x=0$.
4. Plot the direction field for $y^{\prime}=2 x+y$. Also sketch the solution curves pass through $(0,-2)$ and $(-1,3)$ respectively.Don't forget to Put title,color, and label on the graph.
5. Draw the direction field for the following differential equations. Sketch some of the solution curves:
(a)

$$
y^{\prime}=\sin x
$$

(b)

$$
y^{\prime}=x^{2}-2 y^{2} .
$$

(c)

$$
y^{\prime}=y-x
$$

(d)

$$
y^{\prime}=\frac{-y}{x} .
$$

