## Midterm Examination

Print your name: $\qquad$
$\qquad$

Print your ID \#: $\qquad$

You have 50 minutes to solve the problems. Good luck!

1. Find the solution:
A. $\dot{y}+2 t y=2 t \cos \left(t^{2}\right), y(0)=0$.
B. $\dot{y}+2 t y=2 t \sin \left(t^{2}\right), y(0)=0$.
2. Solve

> A. $\dot{y}=\left(\frac{t}{y}\right)^{2}, y(0)=1$
> B. $\dot{y}=e^{t-y}, y(0)=1$
3. Determine where the solution of
A. $y^{\prime \prime}+2 y^{\prime}+y=0, y(0)=0, y^{\prime}(0)=a>0$
B. $y^{\prime \prime}+4 y^{\prime}+y=0, y(0)=a>0, y^{\prime}(0)=a$
takes on its maximal value.
[The real number $a$ is given and positive.]
4. Indicate which of the following equations are linear (l) and which are nonlinear ( n ) by circling your answer:
A. $t^{2} y^{\prime}=e^{t} y$
1 n
$y^{\prime}=t-\cos (y)$
1 n
$y^{\prime \prime}+2 y+y^{2}=0$
1 n
$y^{\prime \prime}+e^{t} y^{\prime}+\ln (t) y=0$
1 n
$y^{\prime \prime}+e^{y^{\prime}}+y=0$
1 n
B. $e^{t} y^{\prime}=t^{2} y$
1 n
$y^{\prime}=\sin (t)-\cos (y)$
1 n
$y^{\prime \prime}+\left(y^{\prime}\right)^{2}+2 y=0$
1 n
$e^{t} y^{\prime \prime}+\cos (t) y^{\prime}+y=0$
1 n
$y^{\prime \prime}+y^{\prime}+e^{y}=4$
1 n
5. Solve
A. $y^{\prime \prime}-y=2, y(0)=0, y^{\prime}(0)=0$.
B. $y^{\prime \prime}+y=1, y(0)=0, y^{\prime}(0)=0$.

