MATH 3354-001 Exam I - B 18 February 2013
Make-up

Name _____ Score _____

Answer Problem #1 on this page. Answer Problem #2 - Problem #8 on separate paper. You do not need to rewrite the problem statements on your answer sheets. Work carefully. Do your own work. **Show all relevant supporting steps!** Attach this sheet to the front of your answers.

Directions: If the technique you apply to solve a specific problem is to treat the problem as:

a. a linear differential equation, then specifically identify the component pieces you construct as you solve the equation, i.e., specifically, the integrating factor
b. an exact equation, then specifically verify that the equation is exact before proceeding

1. (12.5 pts) Classify each of the following differential equations by identifying their order and by identifying whether they are linear (L) or non-linear (N).

a. $x^2\frac{d^4y}{dx^4}-x\frac{d^2y}{dx^2}=y\sin x$ Order: ____ L or N: _____
b. $u\frac{du}{dr}-ru=1-r$ Order: ____ L or N: _____
c. $tx''-(t-1)x'+x=t$ Order: ____ L or N: _____
d. $3\dot{y}+y=t+1$ Order: ____ L or N: _____
e. $x^2\frac{dy}{dx}-(1-x)4y=1-y^3$ Order: ____ L or N: _____

2. (12.5 pts) Find the general solution of the differential equation $xy'-2y=x^2-x+1\,on\,(0,\infty)$

3. (12.5 pts) Find the general solution of the differential equation $(x^3-1)y^3dx+x^2dy=0$

4. (12.5 pts) Find the general solution of the differential equation $(3y^2+10xy^2)dx+(6xy-2+10x^2y)dy=0$

5. (12.5 pts) Find the general solution of the differential equation $(x^2-2y^2)dx+xydy=0$

6. (12.5 pts) Solve the initial-value problem $2xy^2+4x=2(3-x^2y)y',\ y(-1)=2$

7. (12.5 pts) Solve the initial-value problem $y\frac{dy}{dx}=x^2+x^2y^2,\ y(-2)=0$

8. (12.5 pts) Find the general solution of the differential equation $y'+xy=xe^{-x^2}y^{-3}$