MATH 250- Review for Test 1
(Revised March 11, 2009)

1. Find the values of m such that e^{mx} is a solution to the DE
$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} - 50y = 0$

2. Find the DE which has the general solution
$8x^2 - y^2 = C$.

3. Solve the DE $\left(\frac{3x}{y} + 2y\right)dx + \left(2x + \frac{3y}{x}\right)dy = 0$ given that xy is an integrating factor.

For problems 4-13, solve the DE.

4. $\frac{dy}{dx} = e^{2x-y}$

5. $(y^4 + 2xy)dx + (4xy^3 + x^2)dy = 0$

6. $2(1 - x^2)\frac{dy}{dx} = y$

7. $(x^2 + 1)dx + x^2y^2dy = 0$

8. $(x^3 + y^3)dx + y^2(3x + ky)dy = 0$

9. $\frac{dy}{dx} = x^3 - 2xy$ where $y(1) = 2$

10. $\frac{dy}{dx} - \cos x = \cos x \tan^2 y$

11. $\cos x \frac{dy}{dx} = 1 - y - \sin x$

12. $\sin\theta \frac{dr}{d\theta} = -1 - 2r\cos\theta$

13. $(y^6 + 2xy^3)dx + (4xy^5 + x^2y^2)dy = 0$

14. Consider the DE $\dfrac{dy}{dx} = \dfrac{1}{x}$.

a) Draw some isoclines with their direction markers for the DE, and sketch several solution curves including the solution which satisfies $y(1) = 1$.

b) Use Euler's method to approximate $y(1.1)$, $y(1.2)$, and $y(1.3)$ where y is the solution which satisfies $y(1) = 1$.

15. Consider the DE $\dfrac{dy}{dx} = 3y + x$.

a) Draw some isoclines with their direction markers for the DE, and sketch several solution curves including the solution which satisfies $y(0) = 1$

b) Use Euler's method to approximate $y(.002)$, $y(.004)$, and $y(.006)$ where y is the solution which satisfies $y(0) = 1$.