Math. 350-01
Fall, 2006
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Third Exam
Wednesday, October 25

This exam is closed book. Make sure your name is on all pages. Show all work, and show it in a logical and organized manner. Each entire problem is worth 33 points, and one point is "free". You may keep this exam sheet.

1. Write down the terms up to and including the x^5 term of the Taylor series expansion for the solution to

$$(1-x)y'' + xy' - y = 0, \quad y(0) = a_0, \quad y'(0) = a_1.$$

2. Find all singular points $x \in [-\pi/2, \pi/2]$ of

$$(x \sin x)y'' + 3y' + xy = 0,$$

and determine whether each singular point you have found is regular or irregular.

3. Determine the general solution of

$$x^2y'' - 4xy' + 4y = 0.$$