Turn in starred problems, and only starred problems, Wednesday 09/21/2016.

Multiple-page homework must be STAPLED when handed in.

Section 4.3:

- 1 (a), (b), (c), (g), *(l), *(n)
- 2
- 6 (a), *(e), *(p), *(t)

Hints and remarks: 1. In problem 1(l) you should use the factorization $x^4 - 1 = (x-1)(x+1)(x^2+1)^2$. The equation has singular points at $x = \pm i$ in the complex plane, but you can ignore these; we are interested only in *real* singular points.

2. Problem 1(n) may look a bit confusing as written, but just carry out one differentiation, using the product rule, before beginning:

$$[x^3(x-1)y']' = x^3(x-1)y'' + \cdots.$$

Use the same approach in 3(t).

3. Problem 6(e) is very simple: it is an *Euler*, or *Cauchy-Euler*, or *equidimensional*, equation. I mentioned this type of equation in class on Monday 9/12; you can also read about it in Section 3.6.1. **You don't need to introduce a series to solve the equation; see class notes or Section 3.6.1.** (However, if you are so inclined it may be instructional to do so and see what happens.)

4. In solving problems 6(p) and 6(t) you should find that the roots r_1, r_2 of the indicial equation do *not* differ by an integer, so the two independent solutions will have the forms $y_1 = x^{r_1} \sum_n a_n x^n$ and $y_2 = x^{r_2} \sum_n b_n x^n$.

5. For problem 6(p) you will not be able to find the general recursion relation, due to the difficulty in carrying out the multiplication of series involved in the term $e^x y'$. Instead, just work with a few terms of the series, without using sigma notation. Find four non-zero terms of each of the two solutions, that is, if the solution is $y(x) = x^r(a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \cdots)$ find a_1, a_2, and a_3 in terms of a_0.