MATH 305 **LAB 2** **Spring 2009**

Name : _____ Partners : _____

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INSTRUCTIONS :

1. Write the names of you and your partners.
2. Write all intermediate steps, and circle the answers.
3. Answers given without sufficient work to support them may NOT receive credit.
4. Every member of a group should turn in the lab report stapled with this paper on top.

1. Do #2 on page 24.

2. Do #23 on page 26.

3. Do #30 on page 27.

4. Show that the following assertions are NOT ture.

   (a) $e^x - 1 = \mathcal{O}(x^2)$, as $x \to 0$ (b) $\cot x = \ \mathcal{o}(x^{-1})$, as $x \to 0$ (c) $x^{-2} = \mathcal{O}(\cot x)$, as $x \to 0$

5. Find the best integer values of α and β in

$$f(h) = 1 + \mathcal{O}(h^\alpha) = 1 + \ \mathcal{o}(h^\beta), \ \text{ as } h \to 0$$

   for (a) $f(h) = e^h$ (b) $f(h) = \cos h$ (c) $f(h) = 1 + \sin(h^3)$ (d) $f(h) = \dfrac{1}{1-h^4}$

6. A sequence $\{a_n\}$ is defined recursively as $a_1 = 1, \ \ a_2 = 3, \ \ a_{n+2} = \frac{3}{2}a_{n+1} - \frac{1}{2}a_n, \forall n \in \mathbb{N}$.
   (a) Use CAS to guess if the sequence converges. If it converges, find the value of limit.
   (b) Use CAS to find the order of the convergence.

7. Do #6 for a sequence $\{x_n\}$ which is defined as $x_1 = 2, \ \ x_{n+1} = \frac{1}{2}x_n + \frac{3}{2x_n}, \forall n \in \mathbb{N}$.